

## **1.Jhunsons**

Jhunsons Chemicals Pvt. Ltd. was incorporated on 7th September, 1992 under the Indian Companies Act 1956. The company which started from the scratch in the business of food irradiation, has today emerged as a fully automatic and continuous Gamma Irradiation and sterilization facility in India. With state-of-art technology and world-class work centers, Jhunsons today boasts of being a niche 24X7 Food Irradiation and Sterilization Company offering services in Radiation Processing of Cosmetic items, Medical Products, pet foods, agricultural products including cereals, herbs, spices & dry fruits among others besides gem stone coloration. In addition, Jhunsons also holds a certificate for being a pollution free industry Atomic Energy Regulatory Board and has also received a voluntary nomination from Bharti-Walmart, India for the use of advanced technology.

As yet another milestone, Jhunsons recently signed contract with Board of Radiation and Isotope Technology (BRIT) in India for transfer of Technology and knowhow of Gamma Irradiation. The organization has also recently setup the project at RICCO Industrial Area, Chopanki, District Alwar in Rajasthan State, India. Moreover, the company has also signed a Memorandum of Understanding with the Board of Radiation & Isotope Technology (BRIT), India for the transfer of Radiation Processing Technology which is one of the biggest achievement for the organization, culminating in the setting up of a fully computerized and automated plant marking a significant milestone. Some of the most eminent customers of Jhunsons Chemicals are Bajaj Overseas Impex, Divya Gems, ADS Hitech Polymers Ltd and Agro Food Industries and many more.

## **Agriculture!**

Agricultural products are the most important product of world trade commodities and are also extremely prone to microbial contamination. Hence the need to protect them from spoilage, which could be disastrous, is of supreme importance. Gamma irradiation is the most preferred process that can be used to eliminate or control pests and microbiological contamination in agricultural products like cereals, grains etc, hence prevent them from spoilage. This process is also extremely beneficial in controlling sprouting. At Jhunsons, our prime focus lies in increasing the shelf-life and maintaining the nutritional value of these products for extended usage.

## **Foods!**

As a leading player in Irradiation & Sterilization Industry in India, we offer our specialized Gamma Irradiation services to various categories of food/ food items. For detailed information, please refer to the list below:-

PET FOOD – At Jhunsons we believe, proper feeding of pets is one of the biggest responsibilities of every pet owner and this what drives us towards offering the best quality of irradiated pet food in India. Our advanced and efficient irradiation process helps in eliminating micro-organisms and contamination from a wide range of pet products. This is because Gamma Irradiation is the best way to kill bacteria, insects etc from food products and it also helps in increasing the shelf life of final products.

Canned /Tinned food - Irradiation of tinned or canned food items like meat, milk, jams, aerated drinks etc are of utmost importance because these food items most likely causes food borne diseases. Also the need to increase shelf-life of these items is maximum because they are meant for long-time usage, hence they need to come with lifetime – longevity. However, the major challenge here is to maintain/enhance nutritive quality and palatability of these itmes, which makes it very necessary for these items to be

processed at a fix/perfect temperature and under certain circumstances. We Jhunsons, with years of experience and expertise, have mastered the art of irradiation of canned/tinned food items effectively and efficiently and will undertake to process these as and when they are included in the list of items that can be processed by gamma radiation.

**Herbs & Spices** – Maintaining the international food standards and processing regulation is the biggest challenge of Indian food industry, when it comes to herbs and spices. And all of these can be ensured only with the help of Gamma Irradiation processing which prevents spices and herbs from the risk of contamination. This process is also very important because in the present times, India is one of the largest suppliers of spices to most of the countries of the world, apart from storing it in abundance for its own people and this makes it necessary for IFI to ensure longevity and safety of these spices for human consumption.

## Medical!

**Medical** - Gamma Irradiation Processing is extremely beneficial for the medical sector because it is the safest and cost-competitive methodology for the irradiation/sterilization of healthcare products, components and packaging. Considering this fact, we at Jhunsons have started offering a comprehensive and cost effective range of Gamma Radiation services for irradiation of Medical products like- Syringe, Needle, Gauge Piece, Band-aid, Glove etc. This helps in decontaminating medical product, pharmaceutical raw materials and veterinary product hence making them safe and sound to be sold to innocent buyer and consumers. So if you too run a medical store or have your own lab or clinic then you are genuinely advised to get your equipments and products irradiated before using it or selling it, as it will make them absolutely safe for use. And what better than the trusted Jhunsons Chemicals for this...!

## Gems!

**Gems** – At Jhunsons, our core priority is to enhance the optical properties of various precious Gemstones like Sapphire, Ruby, Cats eye etc through our advanced Irradiating procedures. Optical properties of Gem stones, which includes color behavior, brightness etc is widely accepted and valued in jewelry industry as well as by those who use them for astrological and numerological reasons. The process of Gemstones Gamma Irradiation, which is basically a conventional process ensures, none of these qualities are lost, resulting in making the Gems less precious. These products are irradiated through industrial gamma irradiation plants, which are optimized to irradiate products in atmospheric environment and stepped linear movement in front of the source rack.

## Dry Fruit!

**Dry Fruit** besides being one of the most important light-food/snacks-food items also forms a significant portion the food commodities traded across the globe. However, these food products are evidently prone to yeasts and molds which can destroy them easily and quickly. This had led to the need for technology which could protect dry fruits from getting spoilt by toxigenic fungi, yeasts and molds. Considering this need, we at JCPL, have specialized in processing/irradiating Dry Fruits like almonds, cashew nuts, raisins, sultanas, figs, dates, peaches, blue plums and chokeberry etc, all of which is supposed to be offered to consumers with at least a year's durability...And this is done to make food items safe for human consumption and to increase their shelf-life.

## **2.Krushak**

(Krusha Utpadan Sanrakshan Kendra) the technology demonstration plant set up by BARC at Lasalgaon, district Nashik, Maharashtra, for demonstration of low dose applications of radiation for preservation of agricultural commodities. The plant was dedicated to the nation by the Prime Minister Atal Bihari Vajpayee on October 31,2002.

For radiation processing Krushak uses gamma radiation from a cobalt-60 source. The plant is designed to process 10 tonnes of onion/hour. It is a forerunner for more such facilities.

### **Radiation Processing of Food: A Clean & Safe Technology**

**K. S. Parthasarathy**

**Secretary, Atomic Energy Regulatory Board**

Sometime, the fresh looking food may contain harmful bacteria. Contaminated food causes food poisoning, which, in rare instances, may be fatal. The concern over the prevalence of food-borne diseases is mounting. The US Food and Drug Administration recognized that radiation processing is the only known method to eliminate deadly bacteria in raw meat.

Harmful bacteria such as E-coli thrive in meat. This bacteria can cause haemorrhagic colitis leading to high fever, vomiting and bloody diarrhoea. The patient is dehydrated. If the patient has weakened or immature immunity system, the disease may progress to kidney damage.

Radiation processing is useful in preservation of food, control of sprouting of items such as potato and onion and control of food-borne diseases. It destroys or inactivates organisms that cause spoilage thereby extending shelf life of certain foods. But foods must be kept in airtight bags to prevent re-infestation.

The process is energy efficient. It does not leave any residue. The products remain closer to the fresh state in flavour, colour and texture. The chemical change in food due to radiation processing is so small that it is difficult to design a test to identify whether a food has been irradiated. During the process, no liquid is added; it does not cause loss of natural juices. Large or small amounts of foods can be irradiated in appropriate containers.

Radiation processing of food is essentially a cold process. Because of this, nutrient losses are significantly less than those associated with canning, drying and heat pasteurization. Macro nutrients such as carbohydrates, proteins and fats undergo no change during radiation processing.

Under the radiation processing, food is treated by ionizing radiation. The process greatly reduces, but does not eliminate, bacteria. The American Dietetic Association, The American Council on Science and Health, American Medical Association, the American Council on Science and Health, the American Medical Association, the Council for Agricultural Science and Technology, IAEA, the Institute of Food Technologists, the Scientific Committee of the European Union, the United Nations Food and Agricultural Organization and the World Health Organization have endorsed the process. Approval for the process came after 40 years of scientific research and testing. Food scientists have not studied any other food technology more extensively.

According to IAEA currently health and safety authorities in over 40 countries have approved radiation processing of over 60 different food items ranging from spices to grains to de-boned

chicken meat, to beef, to fruits and vegetables. As of August 1999, over 30 countries irradiate food commercially. Nearly 60 radiation processing facilities are operated worldwide; more are getting ready in different countries. But the total amount of food products irradiated is estimated to be about half a million tonnes — a small fraction of the total amount of processed foods.

There is a mistaken notion that irradiated food is radioactive. Gamma rays from Cobalt 60, electron of 10 million electron volts and X-rays of 5 million electron volts are the only types of radiation approved for use in the process. These radiations will not make food radioactive. No radioactivity is produced or released during the process. It is also impossible for a “meltdown” to occur in a gamma irradiator facility.

The European Commission’s European Committee for Standardization has published six standards to identify irradiated food. Irradiated food containing fat can be identified by gas chromatographic analysis of hydrocarbons. If irradiated food contains cellulose or bone or crystalline sugar, electron spin resonance spectroscopy is used. Spices may contain traces of silicate minerals.

Thermoluminescence of the silicate fraction is useful to identify irradiated spices. More sophisticated methods such as photo stimulated luminescence. DNA comet assay are also used in the case of some foods.

The irradiators are designed with several levels of protection. A system of carefully designed interlocks ensures that no person can enter the radiation area when the source is exposed. The staff employed at the facility are well trained and qualified. The operating procedures are followed and AERB inspects the facility periodically and reviews the safety reports from the radiological safety officer. The radiation doses to workers in the facilities are only small fractions of the limit prescribed by AERB.

The Atomic Energy (Control of Irradiation of Foods) Rules 1996 and the Prevention of Food Adulteration (Fifth Amendment) Rules 1994 and other rules and notifications issued from time to time are the rules applicable for commercial radiation processing of food in India. The Department of Atomic Energy and the Atomic Energy Regulatory Board enforce the former rules. DAE licenses the irradiator after AERB issues a certificate of approval. Before this, inspectors from AERB ensure that the installation satisfies all the prescribed safety requirements.

AERB is empowered to withdraw the certificate of approval if it is found necessary.

The DAE has licensed four radiation processing facilities so far. More facilities are being planned in the near future

AERB has standardized the procedure to issue certificate approvals to any applicant in the shortest possible period. Wrong notions have come in the way of achieving progress in the commercial use of radiation processing.

The International Consultative Group on Food Irradiation had listed several studies to show that the consumer acceptance of the technology improved when they are informed about the facts about this unique technology.

On February 22, 2000, US FDA (Food and Drug Authority) issued final rule which permitted use of radiation to refrigerated or frozen uncooked meat and the meat products to reduce levels of food-borne pathogens, and to extend shelf life.

## **Electron Beam Technology for Industrial Accelerators:**

### **BARC's Endeavour**

**Dr. R. C. Sethi**

#### **Accelerator & Pulse Power Division, BARC**

Electron beams have established themselves as potential tools both in basic as well as applied sciences. Industry also has been immensely influenced by their vast potential. Beams with varying power and energy are being extensively employed for radiation processing of materials and have totally revolutionized this field. For example electron beams are gradually replacing the old methods of curing of coatings, adhesive and paints. This not only tremendously improves the quality of the products but also gives an everlasting effect. Similarly, the electron beam processing of cables and sheets vastly improves their thermal and mechanical properties. The irradiation of semiconductor devices has brought in a total transformation in the IC and microchip industry. The sterilization of disposable medical products is another area where electron beams have made a big impact. The usage of electron beams for food preservation have revolutionized the concept of food storage. The art of producing exotic colours in gems and stones is also getting monopolized by electron beams. These stones have a big international market. Even the pathogenic germs of the sewage & sludge are being treated by these beams. Now, on a vast scale, the organically contaminated soils are going to be processed by electron beams. The field is growing and expanding at a fast pace.

BARC had long back realized the enormous potential of electron beams and chalked out an elaborate indigenous technological development programme. Depending upon the product and the type of radiation processing, the requirements of energy and power vary vastly. The energy may go anywhere from a few hundred keV to a few MeV and the power from a few hundred watts to a few hundred kilowatts. A single accelerator or one type of accelerator cannot meet such requirements. To cover the diverse areas of applications, it was decided to build a 500 keV, 10 kW DC accelerator, a 3 MeV, 30 kW DC accelerator and a 10 MeV, 10 kW RF Linac.

The Electron Beam technology has made inroads in many of the areas. DAE has an ongoing programme for building of industrial accelerators as well as developing their applications. BARC and CAT have taken up programmes to build industrial electron beam machines and related facilities to help Indian industry to keep pace with the technology development.

BARC, that has gathered sufficient experience in the field of electron beam technology, has been setting up an Electron Beam Centre at Navi Mumbai. This centre will be equipped with 3MeV and 10MeV accelerators. The accelerators with such high powers, being designed and built for the first time in the country, are a big technological challenge because of the nonavailability of many of the sophisticated components. This endeavour is described here.

### **500 keV DC Accelerator**

In the year 1995, this accelerator was taken up for development. It is a Cockroft Walton based DC accelerator designed to give 20 mA of electron beam at an energy of 500 keV. The accelerator is housed at BRIT complex, Vashi, Navi Mumbai. Since last year, the accelerator is in regular operation at a power level of about 3.5 kW and energy 350 keV. Its up-gradation to full power level is planned in the near future. In parallel, it is being fully computerized and converted into a single push button machine.

At present, the accelerator is in use for surface modification studies in BARC. Apart from that, industries such as Reliance India Ltd. (RIL) are using it for cross linking of plastic sheets & granules. Hindustan Lever Ltd. (HLL) is planning to irradiate its brand of wheat flour by utilizing this facility. Accelerator & Pulse Power Division, BARC and IIT-Madras, Chennai are pursuing radiation damage studies of materials including electrical & electronics circuits.

This is the only indigenously developed accelerator in the country which is operating at such a high power level. A view of this facility is shown in fig. 1.

**Fig.1: 500 keV DC Industrial Electron Accelerator**

### **3 MeV, 30 kW DC Accelerator**

This accelerator is designed to deliver 30 kW of beam at an energy of 3 MeV. A schematic of this machine is shown in fig. 2. The 5 keV beam from the electron gun is accelerated to 3 MeV in the acceleration tube. The beam, after passing through the scan magnet chamber is let out in the air through the scan horn and is used for processing of the materials. The high voltage system comprising corona guard rings is connected through rectifier chains, each of which generates an effective voltage of about 50 kV. In all, there are 70 such chains giving rise to a voltage of more than 3 MV. The accelerator tank having a diameter of 2 m and a length of 7 m, is pressurized with sulphur hexa fluoride (SF<sub>6</sub>) at a pressure of 6 atmosphere. SF<sub>6</sub> helps in holding the high voltage without any serious breakdown.

**Fig.2: 3 MeV DC Accelerator**

This machine is full of technological challenges. The 45 kW, 120 kHz oscillator is being designed and built for the first time in the country. The corona guard, RF electrodes and HV dome, that have highly complicated configurations, are being addressed for the first time. All these subassemblies have to be maintained with a mirror finish. The fabrication of the accelerator tank encapsulating the cooling of SF<sub>6</sub> gas, is another major task.

### **10 MeV, 10 kW RF Electron Linac**

It is a coupled cavity Linac, capable of giving 10 MeV beam with a power of 10 kW. In fig. 3 is shown a view of this accelerator. The 50 keV electron beam from the gun is accelerated to 10 MeV in the Linac cavity having a length of about 1 m. After the energy analysis, the beam is passed to the scan horn through the sweep scanner. The cavity is powered through a wave guide plumbing line consisting of a circulator, directional coupler, power divider, ceramic window etc. The line is fed by a klystron based microwave source which can deliver a peak power of about 6 MW at a microwave frequency of 2856 MHz. This source is being designed and built by SAMEER, Mumbai. The rest of the systems are similar to the 3 MeV machine.

**Fig.3: 10 MeV Industrial Accelerator**

The Linac technology is the most sophisticated one. Primarily, the cavity and the microwave source are one of the most intricate subsystems. The cavity should exhibit highest possible

Q, the field uniformity and proper dispersion at the operating frequency. The geometrical deviations have to be confined within a few tens of microns. Similarly the microwave source ought to show highest possible stability at the maximum power level. All the microwave components of this accelerator will be handling very high average power, a task being attempted for the first time in the country.

### **Electron Beam Centre**

To exploit the benefits of electron beam technology fully, BARC is setting up an Electron Beam Centre (EBC) at Kharghar, Navi Mumbai. The place is located at a distance of about 25 km from BARC. The land for the same is given by SAMEER, which is also a participant in this programme.

EBC house both, 3 MeV and 10 MeV machines. Apart from housing the two accelerators, the centre is being equipped with labs which will cater to the future developments and advancements to be carried out in the subsystems such as electron guns, cavities, microwave sources, beam handling devices, computer controls, chemical processing, quality controls etc. For taking care of the high voltage components, a clean room is being set up. Apart from that, a small workshop, a library and a seminar hall is also being planned. With the incorporation of all these features, EBC will be a novel & unique facility in the country, for carrying out R & D in the area of industrial accelerators and their applications.

### **Building of Electron Beam Centre at Kharghar**

A view of the EBC building depicting the 3 MeV & 10 MeV cells is shown below. The building is functional along with all its utilities and the labs. On the accelerators front, quite a few subsystems such as electron guns, gun modulator, prototype Linac cavity, vacuum pumps, control consoles, power supplies, microwave power source, are being assembled and tested in their respective labs., at the EBC site. These are going through the usual phase of debugging and perfection.

### **Conclusions**

The accelerators with such high powers are being designed and built for the first time in the country. They are a big technological challenge, more so, because of the nonavailability of many of the components such as klystrons, thyratrons, circulators, ceramic windows, acceleration tubes etc., in the country. To put this technology on a strong footing, these will also have to be developed within the country. Here, DAE-BRNS is playing a laudable role. It is roping in many institutions like CEERI Pilani, SAMEER and others, to develop such devices. BARC is going ahead with full force in this endeavour. Within a few years, it should be possible to attain perfection in this intricate technology. The remaining subsystems are in the advanced stages of fabrication at BARC and outside. The accelerators will be available for utilization in the year 2003.

## **Agrosurg Irradiations (India) Pvt Ltd**

is a stellar presence in the business of irradiation, disinfection & sterilization services in India since 2008.

Our state-of-the art facility at Vasai, Maharashtra India is a multi-product radiation processing unit for pre-packaged products. The facility plant is set in an extensive 2.2 acre area. We employ the unfailing Gamma radiation using Cobalt-60 in our fully automated plant.

**Agrosurg is a multi product irradiation facility for sterilization & bioburden reduction operational since 2008.**

**Our up-to-the-minute facility in Vasai, Maharashtra, today services irradiation of several categories of products including Food, Medical, Cosmetics, Surgical, Ayurvedic, Herbal, Bird Food, Animal Food & Dog food among others.**

**Our irradiation plant is an endeavor in collaboration with the Board of Radiation & Isotope technology (BRIT) & Government of India's Department of Atomic Energy (DAE).**

### **AGROSURG MISSION:**

**Quality assurance is vital for the success of irradiation technology. This requires development of standardised procedures, harmonization of process validation & control. At Agrosurg, we strive to achieve this balance & provide exemplary services to our prized customers.**

### **AGROSURG VISION:**

**It will be our constant endeavor at Agrosurg to keep abreast of the latest technology, provide time bound & effective solutions, and maintain the highest safety standards at our facility.**

**Broadening our parameters- by which we mean to widen our customer base while catering to emerging industries & products. This will be attained by helping our personnel undergo all the necessary training at appropriate times.**

**For us this is a way of life at Agrosurg. Engineering excellence, diligent team work & a never-say-die spirit.**

### **OUR PEOPLE:**

**Emerging as a collective dream of engineering professionals, Agrosurg is helmed by Mr Harshad Doshi, as M.D & Promoter. With a B.E from VJTI & M.Tech (Electrical) from IIT, Mumbai, his cross disciplinary knowledge in the design, installation & Operation of the multi-product Gamma irradiation is the cohesive potential we ride on.**

**Mr Pranav Parekh, Executive Director, MBA, with over 5 years of experience. He oversees the administrative & the everyday running of the plant.**

**We, Agrosurg Irradiations (India) Pvt Ltd are one of the fortifying pillars & a much trusted entity in the sensitive commerce of healthcare. We offer & deliver the ideal results in Disinfection, Sterilization & Irradiation services.**



With new medicinal & food products testing the market-waters regularly, Healthcare has become a key issue. Healthcare organizations, Pharmaceutical Companies & Elected Governments stretch every sinew to secure the health of their customers & citizens. We help them stay on course.

This is about our general role in the larger scheme of things With zero scope for error, much more besides the reputations of those involved are at stake. In fact, the stakes are life –no less.

**Work culture:**

When it comes to safety the word compromise is ruled out. With nothing less than ideal as the goal, we maintain impeccable quality control with impregnable safety standards. From the point the material arrives in our facility to dispatching the goods from our facility post irradiation, we keep a controlled check on the proceedings.

Ours is a well earned reputation, acquired through an impeccable track record- a reputation we guard fiercely. This firmly cemented integration has helped us maintain a growing clientele list across various sections from medical & food industry.

**Team Spirit:**

Our streamlined workforce consisting of a Facility In-charge, Plant In-charge, Radiological Safety Officer, Quality Controller, Plant Operator can be relied upon for their domain expertise, friendly & prompt services. It is with reason that our clients form and carry on a stretched association with us...

**Why GAMMA RADIATION**

Gamma Radiation is the most widely accepted choice, both by manufacturers & end-users. In the sterilization of medical products it offers an array of benefits. Pricing & sterility assurance on one side there is a long-list of other rewarding features like:

Causing least damage to the basic material compared to any other preservation technique.

Zero condensate drainage & heat stress in the process as there is no moisture or heat generation in the method.

Environment friendly process. "Time of Exposure" is the only factor that needs to be checked.

Speedy Process, Sterilizes product of various dimensions, Product can be used immediately, Does not leave any residual fumigants, Can sterilize heat sensitive products, Inhibits sprouting of tuber, bulbs & rhizomes in Onion & Potato, Extends shelf life by purging damage due to insect disinfestations & microbial load in cereals & legumes, Delays early ripening in fruits like mangoes, Eliminates pathogens & parasites like E Coli & Salmonella, Thoroughly sanitizes spices & condiments, Eliminates the quarantine barrier.

Given the current crop of irradiators in the business, we give you a number of well found advantageous reasons to work with us.

We use a power free conveyor helping us achieve a wider dose range. We can provide intermediate doses if required. We follow good irradiation practice. We can handle a variety of packaging in terms of

weight, shape & size i.e bags, boxes, gunny bags and canister. We have FDA, DAE licenses for class 4, 6, 7, 8 of food products & category 1 to 6 for allied products & Medical license. We have been accredited with ISO 9001:2015, ISO 22000: 2005, ISO 13485:2016 & complied with c GMP, 11137:1&3. Strategically located on the Mumbai-Ahmedabad Highway our clients located in Western India & exporters can readily use the Mumbai ports. Our being out of Mumbai City limits means the Octroi tax is inapplicable.

#### The Process:

We, at Agrosurg Irradiators (India) Pvt. Ltd strive for sustainable leadership through Multi product Irradiation Services including low as well as high dose products from the range of 1kGy to 25kGy and above.

Our adherence to protocol ensures 100% safety & all procedures of ISO, GMP, HACCP are followed.

We have overhead, power and free conveyor and our process is continuous which enables us to deliver wide range of doses. Our tote box design is such that it can handle products packed in cartons, gunny bags etc. of various dimensions and weight.

We can handle products in 3 dimensions.

560x410x1020 mm.    Weighing 45 Kgs

560x410x510 mm.    Weighing 23 Kgs

560x410x330 mm.    Weighing 15 Kgs

We use Ceric-Cerous Dosimeters for measurement of dose. Dosimeter is placed on the raw material in duplicates at minimum and maximum position in the first tote box, every increment of 24th tote box and the last tote box of the consignment. If the consignment is small, dosimeter is placed in the first and the last tote box.

Irradiation label containing the product details, hologram & the indicator button is placed on the raw material which is loaded in the tote box and the tote box is loaded on to the loading conveyor.

Dwell time is set and the source is exposed, the plant is operated and the processing begins as per the laid down procedure. There are 34 carriers, out of which 24 carriers are stacked inside the cell near the source and the remaining carriers are stacked in the labyrinth.

At the end of the dwell time, one carrier will come out from the irradiation cell and another carrier will go inside the cell to occupy 24 positions. The tote box containing raw material (non-irradiated product) gets loaded in the bottom shelf of the carrier that came out from the irradiation cell. The existing tote box present in the bottom shelf that is half irradiated is lifted up and loaded in the top shelf of the carrier. The existing tote box that is present in the top shelf is unloaded which contains completely processed material (irradiated product). This procedure is called Shuffling and it is done so that uniform dose is delivered to the product.

One by one the completely irradiated material will come out. The shift in charge removes tote box containing dosimeters. The dosimeters are measured using the electrochemical cell. All the relevant records are maintained.

We have established and applied a traceability system that enables the identification of product lots and their relation to batches of raw materials, processing and delivery records. The traceability system is able to identify incoming material from the immediate customers and the initial distribution route of the end product back to customers.

We have a strong internal and external communication system to ensure sufficient information on issues concerning safety of the product received for irradiation. We have regular internal audits and management review meetings to ensure verification & evaluate the results of entire gamma irradiation process.

We value training, participation, openness, trust, creativity and approachability at all levels. We are committed to provide safe & hygienic work environment for Personnel & Product & also ensure environment safety through applicable statutory and regulatory requirements

**Medical:**

Sutures.

Hemostate medical devices.

Ophthalmic Ointments.

Cellulosic Products.

Metallic Products.

Plastic & Rubber Products.

**Surgical:**

Absorbent cotton wool products.

Absorbent gauze products.

**Cosmetics:**

Minerals.

Pigments.

Body care & cleansing products.

**Ayurvedic:**

Ayurvedic medicines & raw material.

Herbal medicines & their products.

**Packaging Material:**

Aseptic bags.

Packaging material for food & medical products.

**Food & Allied Products:**

Cereals, Pulses, Nuts, Oil seeds, Dried fruits & their products.

Dry Vegetables, Seasonings, Spices, Condiments, Dry herbs & their products, Tea, Coffee, Cocoa & Plant products.

Ethnic Food, Military Rations, Ready to eat food, ready to cook food.

Food additives.

Health food, Dietary Supplements & Nutraceuticals.

Dry food of animal origin. Mangoes, Onion, Garlic, Onion Powder, Garlic Powder, Cereals, Pulses, Ayurvedic, Spices, Ready to cook & Ready to eat mix.

**Animal & Pet Food:**

Dog food.

Bird Feed.

Pet food.

**Miscellaneous:**

Leather Products.

Crayons.

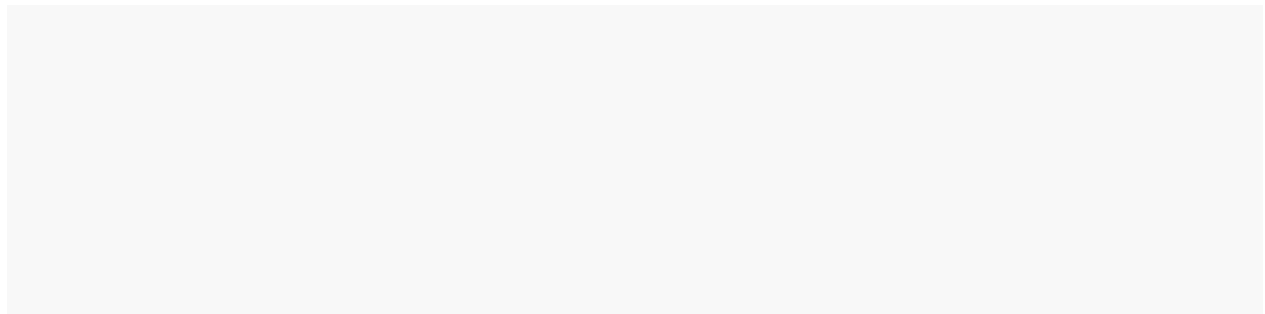
**We have been accredited with:**

**ISO 9001 : 2015 ISO 13485:2016 (BSI) ISO 22000:2018 (URS)**

**Complied with: c GMP**

**USDA – DMF registered company**

**Registered with JAPAN FDA**



## MAHARASHTRA STATE AGRICULTURE MARKETING BOARD IRRADIATION OF ONION.

- Object is to control losses due to sprouting of onions during prolonged storage.
- Irradiation facility is planned to be setup at key onion growing centers in the State.
- Farmers co-operative societies and or private entrepreneurs are encouraged to take up such projects.
- The irradiation technology has been developed at BARC (Bhabha Atomic Research Center).
- Benefits include economic gain due to reduced sprouting losses which could be as 10 - 15%.
- A pilot unit has been set up at Lasalgaon by BARC and ready for imminent operation.
- A farmer's cooperative in Ahmednagar district come forward to set up a project.
- Govt. of Maharashtra has accepted a proposal for funding from NCDC for the project

An Irradiation project is under construction by MSAMB at Vashi, Navi Mumbai. In this facility Mango, Onions, Spices and food grains can be irradiated. In addition to this MSMAB has taken on lease KRUSHAK irradiation facility located at Lasalgaon. In this facility MSMAB has irradiated the Alphonso and kesar mango and raisin of farmers.

### **Products Approved by FDA Maharashtra for Radiation Sterilization at ISOMED, Mumbai**

#### **Approved for routine radiation sterilization**

- Bandages - crape, cotton crape, gauze
- Cotton - buds, pads and swab
- Dressings- paraffin gauze, shell and finger
- Gauze pads
- Kits- maternity, minor surgery & vasectomy
- Absorbable gelatin sponge
- Ophthalmic ointments in paraffin base - atropine sulphate, chloramphenicol, gentamycin sulphate, tetracycline
- Skin ointments in PEG base - neomycin sulphate hydrocortisone acetate alpha chymotrypsin
- Sutures - Catgut, linen, polyester and silk
- Herbal and Ayurvedic products
- Contraceptives, Intrauterine devices
- Perfusion Sets
- Drugs, Pharmaceuticals and Veterinary drugs.

- Orthopaedic Products Bone grafts, Bone Implants, Bipolar, Nails (Tibia and Femur), Orthopaedic implants, A.M. Prosthesis
- **Approved for Export Purpose only**
- Belladonna dry extract
- Chlorotetracycline
- Ergot powder
- Hydrocortisone neomycin
- Rawolfia serpentina

**Table- 2 Products which do not require FDA Approval**

- *Containers and Closures:* Bottles, Bungs, Caps, Droppers, Petridish, Plugs, Spike Caps, Empty kajal barrels, Empty aluminium tubes
- *Medical Accessories:* Aprons, Drapes, Gloves, Mayo trolley cover
- *Surgical Products:* Blades, Gloves, Implants, Instruments and Tools
- **May 19 2020 : RPP, Vashi will function at 33 percent capacity from 20 May 2020.** . Customers are requested to kindly confirm from the office of RPP, Vashi before sending their consignments for processing.
- The Plant is designed for a maximum of 1 million Ci of Co-60 and is capable of processing of wide varieties of products with an approximate throughput of 12,000 Te/ year at an average dose of 10 kGy.