

Standard Operating Procedures- **Packinghouse Facilities for Export of Indian** **Mangoes to USA**

(Name & Address of Packing House Facility)

Document Approved Date: _____	Approved by: _____ Dte of PPQS, IMOA(NPPO)
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Definition of Terms:

APEDA: Agricultural & Processed Food Products Export Development Authority, Which is the 'Cooperator', recognized under the Irradiation Operational Work Plan between India and USA

Dte of PPQS: Directorate of Plant Protection, Quarantine & Storage established under the Indian Ministry of Agriculture (Department of Agriculture & Cooperation), which is NPPO.

IMOA: Indian Ministry of Agriculture

NPPO: National Plant Protection Organization recognized under the International Plant Protection Convention of Food & Agriculture Organization of the United Nations

USDA-APHIS: Animal & Plant Health Inspection Service of U.S. Department of Agriculture.

Section. 1: Management Responsibility & Organization:

- 1.1. Packinghouse Manager is responsible for overall management of post harvest operations at the packinghouse facility.
- 1.2. He is assisted by a production supervisor, a quality supervisor and a process supervisor in day- to-day operations at the packinghouse facility.
- 1.3. Production supervisor is responsible for registration of growers/producers of orchards at the beginning of each fruiting season and entering into a letter of agreement with growers/producers for this purpose. The production supervisor is also responsible for conducting pre-harvest survey of orchards to ensure that the mangoes are harvested for processing at right maturity stage and right pest control practices are in place to minimize the incidence of pests in the orchard. He will advise the growers/producers of orchard about the good agricultural/horticultural practices and training of farm workers/growers/producers to ensure quality production of fruits.
- 1.4. Process supervisor is responsible for planning, supervising and coordination of activities of post-harvest processing and loading/transport of programme articles to irradiation treatment facility and thereafter shipping of treated consignment by air to USA. Besides this, he is also responsible operation and maintenance of pre-cooling/cold storage chambers at the facility.
- 1.5. Quality supervisor is responsible for in-house quality control of post-harvest process and internal auditing of various activities related to post-harvest processing and implementation of quality parameters concerning the post-harvest processing of mango fruits at the facility. He is also responsible for organizing training of workers in post-harvest processing activities and personal hygiene in association with process supervisor.

Section. 2: Registration of Packinghouse facility with APEDA:

- 2.1. Packing house facility engaged in processing of mango fruits under the programme are registered with the Agricultural & Processed Food Products Export Development Authority (APEDA). The packinghouse facility will enter into a compliance agreement with APEDA (Adendum-1) and irradiation treatment facility (Adendum-2)
- 2.2. The registered packinghouse is responsible for:
 - to abide by the irradiation operational work plan and its addenda that was entered between India and USA;
 - to obtain the programme articles (mango fruits) intended for processing only from the orchards registered with the packinghouse facility;

- to maintain specific records of fruit arrival, processing, and shipping to ensure reliable system for traceback of a consignment to a particular programme orchard;
- to ensure that program articles are packed only during certain times of the day, or on certain days when non-program articles are packed and further to ensure cleaning the packing lines before program fruit is packed and/or after non-program fruit is packed, as per Section 9.
- to have documented standard operating procedures (SOPs), which describes in detail all the process related to desapping; cleaning & washing, hot-water treatment with fungicidal dipping, grading, hygienic handling, packing and labeling/marketing of mango fruits for export under the programme;
- to have all the measuring and monitoring equipment calibrated at periodic intervals and calibration records maintained;
- to pack programme articles (mango fruits) only in approved insect-proof cartons and to ensure that only programme articles packed in insect-proof cartons are transported to the irradiation treatment facility in sealed container or conveyance and after irradiation exported to USA. (The insect-proof cartons shall have no openings that will allow the entry of target or non-target quarantine pests. If openings are required for ventilation, they should be covered with insect-proof screen of a minimum of 30 meshes per linear inch);
- to ensure that all the packages are affixed with labels as indicated in Addendum-5 approved by the USDA-APHIS. The labels are appropriately marked/stamped on left-half indicating Production Unit Code Number (PUC), Packinghouse Code Number (PHC), Date of Packing, and Lot Number and conforming to the rules and regulations issued under the India's "Prevention of Food Adulteration Act"; and
- to have proper procedures in place for daily removal of rotten, damaged, insect-infested/diseased fruits from the packing house facility and their disposal as per procedures described under Section-10.

Section. 3: Registration of growers/producers with packing house facility:

3.1. The pack house manager at the beginning of each fruiting season will enter into a cooperative agreement with the registered orchard (Addendum-3). The production supervisor will assign each registered grower/producer with a unique production unit code number (3digits) to trace back the production to the specific registered orchard. The registered packinghouse facility will submit a list of orchards registered with the packinghouse facility to APEDA (the cooperator), NPPO (Dept of PPQS, IMO) and USDA-APHIS. APEDA (the cooperator) will review the list to avoid duplication of PUCs.

3.2. The registered orchards are responsible for:

- to maintain record of all operations carried out at the orchard and to adopt good agricultural/horticultural practices in raising the orchard;
- to apply regular pest management practices such as pheromone trapping to ensure low pest population levels (especially that of fruit flies) in the orchard. The registered orchards will install the fruit fly traps in each orchard at every 400 m and regularly monitor the fruit fly incidence at fortnightly intervals (If any fruit fly is caught in the traps it will be referred to NPPO to facilitate pest identification and brought to the notice of packinghouse facility. Supplementary trapping is resorted to around the area, where the fruit fly is caught and the area is intensively monitored until the fruit fly outbreak is under control. If there is an unusual high outbreak of fruit fly pests from that orchard, the exports from that orchard will be halted until such time effective mitigation measures are in place to minimize the incidence such as timely collection and disposal of ripened/rotten fruits left over in the orchard and burying deep in soil pit covered with 6" soil);
- to use only pesticide products that are registered with the Central Insecticide Board, Directorate of Plant Protection, Quarantine & Storage, Department of Agriculture & Cooperation at the recommended dosages and schedules to control pests;
- to observe registered pre-harvest interval (safe period of harvesting), while application of specific pesticide product;
- to adopt good horticulture practices, while harvesting the fruits and transport to pack house facility (Only healthy, good looking fruits are harvested with sufficient stalk with the help of specially designed harvesters fitted with a horizontally fitted blade at 45° angle and smooth net pouch for holding the harvested fruits. The harvested fruits are lowered and kept in the well cushioned, clean and ventilated plastic crates under the shade until transport to pack house facility. Care should be taken to avoid contamination of fruits/crates with soil by keeping them over the clean plastic sheet/kraft paper spread on the ground);
- to carry out initial grading/packing of fruits at orchard level and remove immature, scarred, damaged/ diseased/ripened fruits (If any immature/scarred fruits noticed he will segregate them in to a separate crate distinctly marked 'not for export to USA' to prevent their transportation to packinghouse facility and if any diseased/ripened/rotten fruits, he will immediately dispose them by burying deep into soil pit at the orchard);
- to adopt hygienic practices, while harvesting/grading/packing into plastic crates at the orchard level.

- to ensure labeling/marketing of each fruit crates with Name of Orchard/Location, Production Unit Code, Product Name/Variety, Date of Harvesting
- to ensure that no non-programme fruits are loaded and transported other than the programme fruits;
- to ensure that the harvested produce transported from orchard to a registered pack house facility in a clean and hygienic transport vehicle.

Section. 4: Pre-harvest Orchard Survey & Field Inspection:

- 4.1. Prior to harvest of the fruits, the production supervisor undertakes a pre-harvest orchard survey and field inspection of orchards registered with the packinghouse facility for the assessment of fruit production.
- 4.2. He carries out appropriate fruit sampling to determine right stage of harvest of fruits for post-harvest processing.
- 4.3. The sampled fruits are visually examined to determine the right stage of maturity. Mangoes for export by sea are harvested, when the fruits are at half-maturity stage and for air shipments the fruits are harvested, when they are fully matured.
- 4.4. The sampled fruits are subject to pressure test with the help of a Magness-Taylor pressure tester to determine firmness of the fruits. A pressure of > 2kg per sq cm has been considered most optimal for most of the varieties of mangoes.
- 4.5. Besides this the sampled fruits are subjected to Brix reading to determine the total soluble sugars (TSS) content with the help of refractometer. For export of mango fruits by refrigerated containers by sea the fruits with TSS content of 7-9 are harvested as these fruits have a longer shelf life of 20-25 days and for export by air, the fruits with TSS content of 10-13 are harvested, which have shelf life of 17-20 days.
- 4.6. He records the incidence of pests and diseases affecting mango fruits and verifies the records of pre-harvest control practices adopted at the orchard viz., the target pest involved, name of the pesticide used, concentration of active ingredient, and the schedule of the spray.
- 4.7. He assesses the healthy fruit production from the registered orchard to facilitate planning of export.
- 4.8. If any pest infestation noticed, the same may be referred to the Dte of PPQS (NPPO) for confirmation of pest identification

Section. 5: Receiving of Produce & Unloading at Packing House facility:

- 5.1. Quality supervisor permits unloading of the produce (fruits) from the orchard registered with the pack house facility at the unloading area (#1).
- 5.2. Quality supervisor records the fruit temperature by inserting the temperature probes in sampled crates of fruits.
- 5.3. Quality supervisor records both tare weight of crates and net weight of fruits with the help of a digital weighing balance (while weighing, care is taken not to weigh more than five crates stacked one above the other at any one time to prevent causing damage to fruits).
- 5.4. Quality supervisor ensures stacking the produce received at the facility, orchard-wise, identifiable by a production unit code number to maintain traceability and to avoid admixing of the produce.
- 5.5. Quality supervisor records the details of the produce received in a product logbook (Addendum-4) maintained at the pack house facility.

Section. 6: Pre-processing Inspection & Storage

- 6.1. The quality supervisor at the beginning of inspection will verify, whether each and every plastic crates containing fruits are suitably labeled/marked providing information on Name of Orchard, Location, Production Unit Code Number, Product/Variety and Date of Harvesting and the fruits received are from programme orchard registered with packing house facility. . If they are not from programme orchards, he will refuse processing at the facility and/ or will distinctly mark them ‘not for export to USA’ and stock them separately away from the programme orchard lots in the pre-processing storage area to prevent commingling, while programme fruits being processed.
- 6.2. He will undertake the random inspection of sampled fruits with the help of trained workers to assess the quality of fruits. If sizable number of immature/undersized, scarred, bruised are noticed, he will immediately segregate that lot and distinctly mark “not for export to USA” to prevent admixing with lots programmed for processing. If any damaged/diseased/rotten fruits are noticed, the same will be segregated and the segregated crates marked distinctly “Rejected” and rejected crates are removed immediately to rejected article storage area to prevent spread of contamination and held until further disposal. The rejected article storage area is physically separated from the pre-processing storage area by a insect-proof screen to avoid admixing and to prevent contamination. He will refer the pest noticed to the NPPO (Dte of PPQS, IMO) for identification.
- 6.3. Quality supervisor records the quantity of rejected fruits each lot-wise (PUC) in the product logbook (Addendum-4) maintained at the facility.

- 6.4. The crates with sound and healthy fruits are stacked in pre-processing storage area (#2), under cool condition under fanning and until moved for processing. He will intimate the process supervisor regarding the arrival of fruits for processing.

Section. 7: Post-Harvest Processing of Fruits:

The post-harvest processing of fruits at the pack house facility is carried out at the post-harvest processing area (# 3) that is clearly segregated from that of unprocessed fruit storage area and entry to the post-harvest processing area is regulated and controlled. All the workers before entering the processing area undergo washing and wear clean disposable aprons/gowns, caps and gloves. The process of cleaning, washing, hot-water treatment and grading at the pack house facility is carried out through a highly sophisticated automated system fitted with roller conveyor with adjustable speed and hot water treatment unit with thermostatic controls under the supervision of process supervisor.

7.1. Desapping of fruits

- 7.1.1. Desapping of fruits is carried out in processing area by trained workers under the supervision of processing supervisor
- 7.1.2. Desapping is done by holding the mango fruits upside down while cutting the stalk of fruits
- 7.1.3. The stalks of mango fruits are cut very carefully to 0.5 to 1.0 cm by trained workers by using a scissor with sharp long nose to avoid causing skin injury

7.2. Cleaning & Washing of Fruits

- 7.2.1. The cleaning & washing of fruits is done at the pack house facility through automated washing system fitted with overhead sprayers and smooth rotating brushes to clean and wash the fruits.
- 7.2.2. At the beginning the workers gently place the desapped fruits in the trays fitted onto the conveyor, which conveys the fruits to the automated water spraying platform, wherein the fruits get washing with a clean water of potable quality mixed with a neutral detergent such as Teapol, Sandovit or Indtron at 0.1% (1 ml of detergent per litre of water). The process of cleaning and washing will take 3-5 minutes. The temperature of water is maintained at 27⁰ C.

7.3. Hot-Water treatment with fungicidal dipping

- 7.3.1. Hot water treatment of fruits is carried out in hot water treatment tanks fitted with thermostatic controls to maintain a constant desired temperature of 52⁰ C. The hot water is treated with fungicide such as Sodium hypo chloride at 200 ppm concentration for 2-3 minutes.

7.3.2. After the treatment the fruits are passed through a drying table till the moisture on the surface of fruits gets evaporated and thereafter wiped with a soft muslin cloth. The fruits are then transferred to a grading and sorting table.

7.4. Sorting/Grading of fruits

7.4.1. At the sorting table, the trained workers wearing gloves sort out the oversized and undersized fruits, immature/scarred/blemished fruits, diseased/insect damaged fruits and as well as fruits with sap injury under the supervision of quality supervisor. The segregated fruits kept in plastic crates are removed at the end each working shift from the process area and are distinctly labeled for disposal.

7.4.2. At this stage, the mangoes are separated according to size by weight into following groups for packing by count. Trained workers, under the close supervision of quality supervisor, do grading manually, after wearing gloves.

7.4.3. The graded mangoes are classified into three classes Viz., (i) Extra Class (ii) Class-1 and (iii) Class-2 as per the quality parameters specified and the tolerances described in “Post Harvest Manual for Mangoes” published by APEDA

7.5. Packaging & Labeling/Marking

7.5.1. Each graded mango is placed into soft, white expandable polystyrene, netted sleeves to prevent bruising before placing it in compressed fiberboard cartons.

7.5.2. The sleeved mangoes are packed in a single layer in compressed fiberboard cartons of interlocking type preferably having a water-proof coating to prevent damage due to high humidity during cold storage. All the holes (ventilator openings of the cartons (packages) are covered with insect- proof screen of a minimum of 30 meshes per linear inch. Only packing material of food grade is used for packing mangoes at the pack house facility and the following standard size of packages are used for packing mangoes for export viz., 370 X 275 X 90 mm.

7.5.3. All the sides of each package are then sealed with adhesive tape to prevent entry of target or non-target quarantine pests.

7.5.4. All the packages are affixed with labels as indicated in Addendum-5 approved by the USDA-APHIS. The labels are appropriately marked/stamped on left-half indicating Production Unit Code Number (PUC), Packinghouse Code Number (PHC), Date of Packing, and Lot Number.

7.5.5. The processing supervisor at the end of packaging will make complete inventory of processing in the product logbook detailing the information on the quantity of fruits/number of fruit crates received for processing; date/time of processing; Quantity/No of cartons packed & rejected quantity of fruits for packing.

Section. 8. Loading, Sealing, Transportation & shipment by air:

- 8.1. The insect-proof packages of processed mango, are immediately loaded into a closed conveyance at the loading area (#7) of the pack house facility and transported to the irradiation facility for treatment to meet the specific phytosanitary requirements of USA. The loading area is provided with secured docking facility to prevent insect gaining entry into the facility.
- 8.2. Before loading the packages, the conveyance is carefully inspected to ensure it is thoroughly clean and free from hitchhiking pests
- 8.3. At the completion of loading at the pack house facility, the doors of the vehicle is closed and locked and suitable seal is affixed to ensure the integrity of processed consignment.
- 8.4. The consignment is then transported to irradiation treatment facility accompanied by a post-harvest process information sheet (Adendum-6).

Section. 9. Facility Cleaning & Sanitation/Personal Hygiene:

9.1. Facility cleaning & Sanitation

- 9.1.1. All the floor areas are swept, cleaned and disinfected with Lysol at the end of each working shift.
- 9.1.2. The toilets/wash basins are cleaned and disinfected with Lysol daily and separate toilets for each sex of workers.
- 9.1.3. All the packing lines/production surfaces and equipment are cleaned, washed and disinfected with sanitizer such as 200 ppm Sodium Hypochloride (NaOCl) solution (bleach) before starting of run of program fruits at the end of each working shift.
- 9.1.4. All the fruit waste, packing materials and rubbish are collected from various areas and moved to closed disposable waste bins and treated with formalin and removed daily.
- 9.1.5. The desapping racks are cleaned, washed and disinfected sanitizer such as 200 ppm Sodium Hypochloride (NaOCl) solution (bleach) thoroughly at the end of each working shift.
- 9.1.6. The long nosed scissors used for cutting the stalk of the fruits are cleaned, washed and disinfected with alcohol at the end of each working shift.
- 9.1.7. The wall surfaces, doors and window frames are dedusted and cleaned at weekly intervals.

- 9.1.8. The solid surfaces of inspection/sorting/grading tables are cleaned and disinfected with cotton swab dipped in alcohol at the end of each working shift.
- 9.1.9. The floors of pre-cooling and cold storage chambers are cleaned and disinfected at the end of each emptying and before loading fresh process load

9.2. Personal Hygiene

- 9.2.1. Every person working at the pack house facility will maintain a high degree of personal cleanliness and given training in personal hygiene and facility sanitation.
- 9.2.2. The workers before entering processing area have to undergo washing and must wear disposable aprons/gowns, caps or hairnet and gloves. The finger nails are kept short, trimmed and clean and wear clean slippers.
- 9.2.3. Toilets are kept cleaned and maintained in hygienic condition. Toilets are clearly separated from the processing area by a corridor and a door frame. Adequate hand washing by workers using liquid soap and drying of hands with paper towels at the end of each use of toilet.
- 9.2.4. No food stuffs/eatables are permitted with in the processing area of the facility and no smoking/chewing of tobacco is permitted within the facility and no wearing of jewellery.

Section. 10. Handling & Disposal of Rejected Fruits

- 10.1. Quality supervisor will record the details of quantity of rejected fruits lot-wise in the product log book maintained at the pack house facility.
- 10.2. The crates carrying rejected fruits are distinctly marked “Rejected” and promptly removed to rejected articles storage area to prevent commingling of rejected fruits, which is physically separated from pre-processing storage area by an insect-proof screen
- 10.3. Quality supervisor will ensure the prompt removal of any rotten/over ripened fruits from the pack house facility, treat and dispose the same on the same day by burying deep in a soil pit and covering with at least 6” soil.
- 10.4. The fruit waste and debris collected from the processing area is removed daily and the floor is disinfected.

Section. 11. Pest exclusion & Fruit fly trapping

- 11.1. Quality supervisor will ensure covering of all external openings viz., windows, ventilators/exhausts in the process area are covered by insect-proof screen of 30 meshes for linear inch.
- 11.2. Quality supervisor will ensure installation of pheromone traps (methyl euginol/Cue lure) to monitor the fruit flies and to take appropriate measures to minimize their incidence.
- 11.3. Quality supervisor will contract the services of pest control operator for undertaking general pest control operations in and around the pack house facility.

Section. 12. Equipment Maintenance & Calibration

Routine inspections are carried out on a monthly basis on all production machinery by the quality supervisor to ensure its cleanliness and safety and a record of these inspections together with the action taken are maintained at the facility.

12.1. Equipment Maintenance & Control:

- 12.1.1. The pack house facility will maintain the following equipments for field/in-house testing viz., digital weighing balance (1 gm accuracy), refractometer, vernier calipers, pressure tester (for testing firmness of the fruits) and temperature probes or sensors (portable/fixed), hygrometer and certified glass thermometer.
- 12.1.2. The pack house facility will undertake annual repair/maintenance of processing equipments such as automated cleaning and washing system, hot water treatment unit and sorting and grading system and validating the speed of conveyor and setting up of thermostatic controls at the beginning of each fruiting season.

12.2. Calibration of Measuring/ Monitoring Equipments:

- 12.2.1. All measuring/monitoring equipments used in field/in-house testing are checked for accuracy and calibrated at periodic intervals as specifically laid down by the manufacturer of the equipment. Both the method of calibration and required precision and tolerances allowed are documented and records of calibration is maintained in appropriate format prescribed in “Post Harvest Manual for Mangoes” published by APEDA.
- 12.2.2. Weighing equipments are calibrated using standard calibration masses (individual precision weights).
- 12.2.3. The temperature probes or sensors fitted to pre-cooling/cold storage chambers/integrated refrigerated containers are calibrated by inserting the probes into ice slurry (made of salt free water) to check the accuracy at 0⁰ C using a certified glass thermometer. However the temperature probes or sensors fitted to hot water

treatment tanks are calibrated at steam temperature (100⁰ C) in a constant temperature hot-water baths using a certified glass thermometer.

- 12.2.4. The other measuring equipments such as hygrometer, refractometer, vernier calipers and pressure tester are calibrated as per the directions of manufacturer

Section. 13. Training of Farm Workers/ Processing Personnel:

- 13.1. The Packing house manager in consultation with quality supervisor will develop procedures for identifying training needs and human resources for organizing training workshops for both farm workers and pack house personnel.
- 13.2. The farm workers will be trained in good agricultural/horticultural practices for quality production of mango fruits; monitoring of fruit flies by pheromone traps; right application of pesticides to control various pests; safe intervals for harvesting; right stage of harvesting; proper method of harvesting; fruit sampling & inspection; proper packing of fruits in crates at the field; and hygienic practices, while handling fruits in the field.
- 13.3. The pack house personnel will be trained in desapping process; cleaning & washing; hot water treatment with fungicidal dipping; sorting & grading; packing & labeling/marketing; palletization; operation & management of pre-cooling and cold storage facilities; and hygienic practices, while handling fruits at the time of processing at the pack house facility.

Section. 14. Management of Documents & Records:

- 14.1. The pack house facility will maintain document and records as per standard operating procedures (SOPs) established as per the requirements of Irradiation Operational Work Plan
- 14.2. The facility will display clear signs for areas authorizing entry and written instructions for compliance by workers/persons, while making entry.
- 14.3. The facility will maintain all the records related to processing viz., records of registered growers/producers registered with pack house facility/written agreements; record of registration of pack house facility with APEDA; record of licensing of facility; record of site plan & approval; records of pre-harvest orchard survey and field inspections; daily product receiving/processing log book; record of pre-processing inspection & quality control; record of post-harvest processing sheet; records of calibration of equipments; records of training of workers; records of customer feed back; records of internal auditing; and records of trade contract and review & export shipments.
- 14.5. The facility will maintain the records, where feasible, both in hard copy and electronic form to facilitate quick retrieval and the same are clearly indicated in master control of

records. The facility will give access for inspection by authorized person at any time of visit.

- 14.6. The facility will maintain production and process records for a period of one year and made available for inspection by regulatory officials. However the calibration and internal auditing records are maintained for at least for 3 years period. Records of trade contracts with the exporters and letter of agreement with the contracted growers/producers are maintained upto the end of each fruiting season.

Section. 15. Customer Feed Back/Auditing & Review

- 15.1. The facility will develop and maintain an appropriate customer feed back and the action taken for ensuring the supply of quality fruits for export.
- 15.2. The facility will establish an internal auditing programme to review the post harvest process of mango fruits at periodic intervals for improving the performance of quality fruit exports in compliance with requirements specified under Irradiation Operational Work Plan between India and USA.

Adendum-1

Compliance Agreement of Registered Packing House Facility with APEDA.	
1. From <hr/> (Name/Address of Registered Packing House Facility)	2. To <hr/> (Name/Address of APEDA)
3. Agreement related to: <i>Export of Mangoes to USA</i>	
4. Applicable Phytosanitary Regulatory Requirements: USDA-APHIS Rule 7 CFR Parts 305 and 319: Importation of Mangoes India	
5. I/we agree to comply with the following: <ul style="list-style-type: none"> - to abide by the irradiation operational work plan and its addenda that was entered between India and USA; - to obtain the programme articles (mango fruits) intended for processing only from the growers/producers registered with the packing house facility; - to have a reliable system for separating programme articles (mango fruits) from non-programme articles and ensuring programme articles traceable back to and trackable from the registered orchard; 1. - to have a well documented standard operating procedures (SOPs), which describes in detail all the process related to desapping, cleaning & washing, hot-water treatment with fungicidal dipping, grading, hygienic handling, packing and labeling/marketing of mango fruits for export under the programme; - to have all the measuring and monitoring equipment calibrated at periodic intervals and calibration records maintained; - to maintain appropriate records related to post-harvest processing of mango fruits at the packing house facility; - to pack programme articles (mango fruits) only in approved insect-proof cartons and to ensure that only programme articles packed in insect-proof cartons are transported to the irradiation treatment facility in sealed container or conveyance and after irradiation exported to USA. (The insect-proof cartons shall have no openings that will allow the entry of target or non-target quarantine pests. If openings are required for ventilation, they should be covered with insect-proof screen of a minimum of 30 meshes per linear inch); - to ensure that each package is labeled/marked with 9 digit Product Code Number (packing house facility (2 digits), producer (3 digits), and date of packing (4 digits)) assigned by the packing house facility registered with APEDA and conforms to US-FDA labeling requirements; - to have proper procedures in place for daily removal of rotten, damaged, insect-infested/diseased fruits from the packing house facility and their disposal; 	
6. Date:	8. Authorized Signatory of the Packing House Facility:
7. Place:	<hr/> (Name/Signature/Designation/Seal)
9. Signed in presence of: <div style="text-align: center; margin-top: 20px;"> <hr/> (Authorized Signatory of APEDA) </div>	

Adendum-2

Cooperative Agreement of Orchard with Packing House Facility.	
1. From <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> (Name/Address of Registered grower/producer)	2. To <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> (Name/Address of Packing House Facility)
3. Agreement related to: <i>Export of Mangoes to USA</i>	
4. Applicable Phytosanitary Regulatory Requirements: USDA-APHIS Rule 7 CFR Parts 305 and 319: Importation of Mangoes India	
5. I/we agree to the following: <ol style="list-style-type: none"> 1. to have a documented traceability system that allows programme articles to be traced back to the registered grower of mango orchard and tracked forward to a registered packing house facility. 2. to maintain up-to-date records of orchards, describing exact location, extent of orchard (ha), number of fruit bearing trees, age of orchard, varieties of mango cultivated, plant spacing, average yield of mangoes/tree. 3. to maintain documented records referencing to individual farm covered by a crop with sequence of all agronomic/horticultural operations carried out on farm calendar-wise. 4. to not use human sewage sludge for fertilizing orchard or untreated sewage water for irrigation and fertigation. 5. to use only registered pesticide formulations according to label recommendations and recommended dosages. 6. to maintain documented records of all pest control practices Viz., name of pesticide used (Chemical/Trade), active ingredient, dosage used, spraying schedules, stage of crop and target pest involved. 7. to adopt recommended safe pre-harvest intervals with the use of chemical pesticides. 8. to undertake regular monitoring of fruit flies by pheromone (methyl euginol/cue lures) traps and to take appropriate control measures to minimize their incidence. 9. to use good quality of water for irrigation/fertigation. 10. to adopt recommended package of practices (horticultural standards) established by the Department of Agriculture/Horticulture for the management of orchard 11. to ensure to adopt good hygienic practices by farm workers, while handling of fruits during harvesting, initial grading and packing into plastic crates and transporting harvested fruits for processing. 12. to have a documented procedure regarding the disposal of rotten/ripened/infested fruits at the farm level. 13. to maintain a high level of sanitation of orchard and periodically clean & disinfect the orchard equipments such as secatures, pruning shears, harvesters, cutting knives to prevent disease spread through contamination. 14. to allow the regulatory officials to visit the orchard to assess the phytosanitary status of orchard and give access to the records maintained and abide by their instructions. 15. to abide by the Irradiation Operational Work Plan and its addenda established between India and USA for export of Indian mangoes to USA. 	

6. Date:	8.
7. Place:	<u>(Name/Signature of Registered Grower/Producer)</u>
9. Signed in presence of: <u>(Authorized Signatory of Packing House Facility)</u>	

Adendum-3

Co-operative Agreement of Packinghouse Facility with Irradiation Treatment Facility.	
1. From <hr style="border: none; border-top: 1px solid black; margin: 5px 0;"/> (Name/Address of the packinghouse facility)	2. To <hr style="border: none; border-top: 1px solid black; margin: 5px 0;"/> (Name/Address of Irradiation Treatment Facility)
3. Agreement related to: <i>Export of Mangoes to USA</i>	
4. Applicable Phytosanitary Regulatory Requirements: USDA-APHIS Rule 7 CFR Parts 305 and 319: Importation of Mangoes India	
5. I/we agree to the following: <ul style="list-style-type: none"> - to have a documented traceability system that allows programme articles to be traced back to the registered packing house facility and registered orchard. - To pack the processed fruits insect-proof cartons of size 370 X275 X 90 mm and ensure complete sealing of all sides with adhesive tape to prevent entry of hitch hiking pests - to use packing material of food grade approved under Prevention of Food Adulteration Act of GOI and rules framed there under - to affix the or preprint the label as approved by USDA-APHIS on each and every carton and stamp/mark with indelible ink indicating Production Unit Code (PUC), Packinghouse Code (PHC), Date of Packing and Lot Number on the left half of the label and other relevant information as required - to transport only processed fruits, from programme orchards, in closed conveyance to the irradiation treatment facility - to pay the treatment fees and other charges at scheduled rates as determined by the irradiation treatment facility - to transport treated articles immediately after treatment in closed and sealed truck or conveyance by direct route to Mumbai international airport for shipment to USA and not to open the container en-route to airport - to safe guard the treated fruits while storing at the airport or trans-loading into air containers to prevent infestation by hitch hiking pests - to immediately remove the rejected articles from the premises of irradiation treatment facility - to abide by the conditions and requirements of Irradiation Operational Work Plan. 	
6. Date:	8. <hr style="border: none; border-top: 1px solid black; margin: 5px 0;"/>
7. Place:	(Name/Signature of Registered Packinghouse Facility)
9. Signed in presence of: <div style="text-align: center;"><hr style="border: none; border-top: 1px solid black; margin: 5px 0;"/>(Authorized Signatory of Irradiation Treatment Facility)</div>	

Adendum-4

Post-harvest Processing Information Sheet

1. Name & Address of Packing House Facility: _____
1. Contact Person (Name/Tel/Fax/E-Mail): _____
2. Product Identification Number:

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(PHC (2)/PUC (3)/DoP (4))
4. Production Unit (Orchard Name/Location): _____
5. Name of the Product (Common/Botanical Name)/Variety: _____
6. Quantity (No. of Packages/metric tones) processed: _____
7. Date/time of arrival of commodity at packing house: _____
8. Temperature of fruit on arrival at Packing House: _____
9. Temperature/humidity condition at which the fruits are held during processing: _____
10. Date/time of completion of processing: _____
11. Details of Processing:
 - 11.1. Desapping: **Yes/No**
 - 11.2. Cleaning & Washing of Fruits: **Yes/No**
(Specify water quality/chemical used): _____
 - 11.3. Hot water treatment with fungicide: **Yes/No**
(Specify temp/exposure time): _____
(Specify name of fungicide/concentration): _____
 - 11.4. Air-drying/brushing: **Yes/No**
 - 11.5. Weighing/sorting/grading: **Yes/No**
12. Details of packaging/labeling/marketing:
 - 12.1. Packing material used conforms to USDA-FDA standard: **Yes/No**
(Specify packing material used): _____
 - 12.2. All Ventilators of package covered by insect-proof screen of 30 meshes per linear inch and all the sides sealed with adhesive tape: **Yes/No**
 - 12.3. Dimensions of Package box used: _____
 - 12.4. Average Number of fruits /Weight of fruits per box: _____
 - 12.5. Labeling/marketing (9 digit code as per APEDA): **Yes/No**
 - 12.6. Individual fruits are sleeved with polypropylene sleeve to avoid bruising: **Yes/No**:
13. Details of transportation from packing house to treatment facility:
 - 13.1. Transport by Closed conveyance: **Yes/No**
 - 13.2. Transport vehicle No: _____
 - 13.3. Date/Time of loading: _____
14. Authorized Signatory of Packing House Facility: _____

(Name/Signature/Seal/Date)

Adendum 5

KRUSHAK B.A.R.C., Lasalgaon, INDIA	
	
Treated by Irradiation	
PUC:	TFC:
PHC:	TIN:
Packing Date:	Treatment Date:
Lot Number:	
<i>Area for Country- specific requirements</i>	

