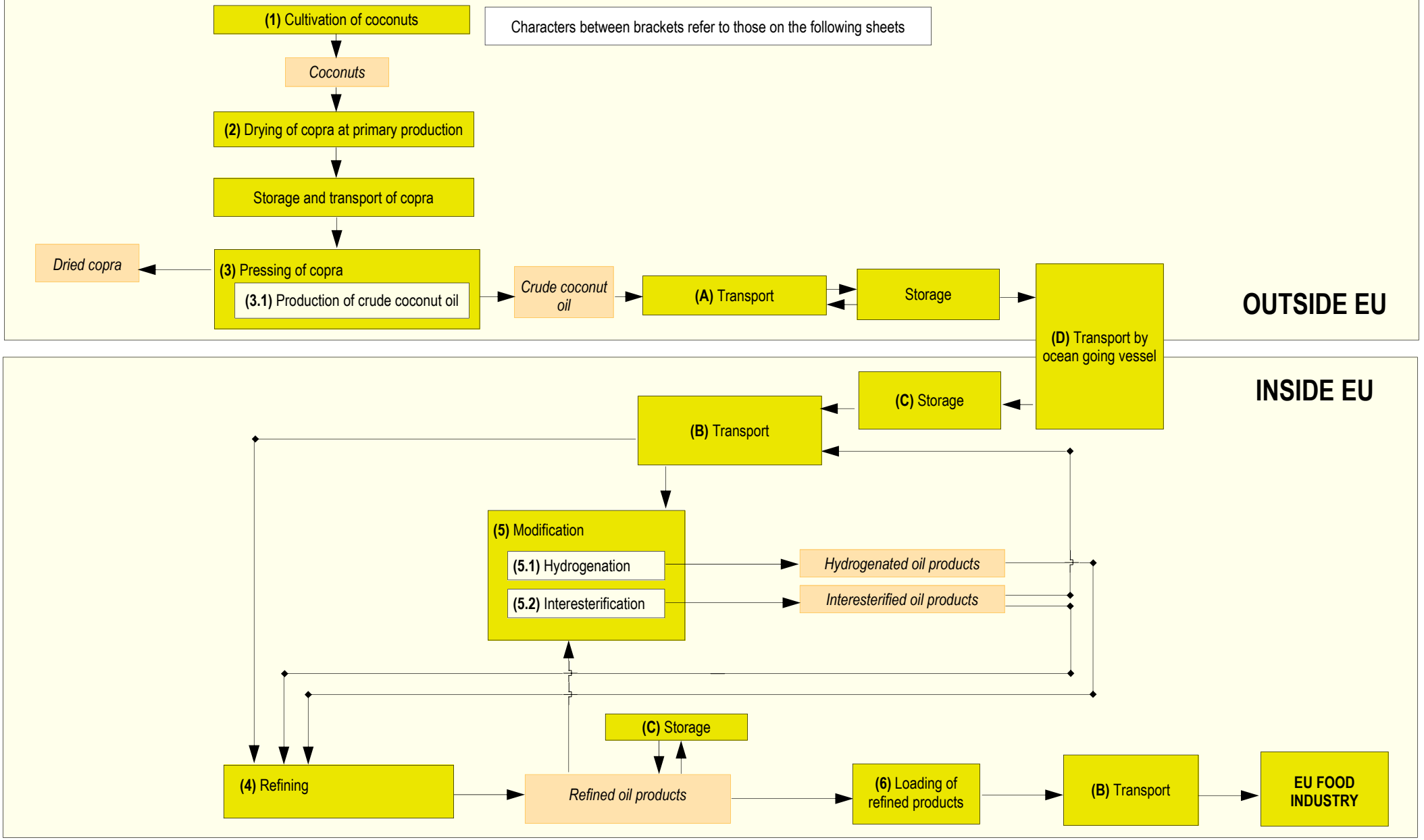
Flow chart of the production chain of coconut oil products for food application in the EU



Risk assessment of the chain of coconut oil products

			1. Cultivation of coconuts*						
HAZARD	**CAT.**	**CHANCE**	**SERIOUSNESS**	**RISK CLASS.**	**PRP or CCP**	**JUSTIFICATION**	**LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS**	**CONTROL MEASURE**	**REMARKS**
Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.	C					The countries of export of coconut oil (Philippines, Indonesia and others) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation. Hitherto no residues of pesticides have been detected in coconut oil.	EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products.		

* Assessment of risks in this part of the chain is out of the scope of this document. See the methodology document paragraph 2.3 for more information.

2. Drying of copra at primary production*									
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contaminants caused by drying									
- PAHs	C					Plantations dry copra on open fires, a source of PAH contamination for the copra.			Sun drying or indirect drying with heat exchangers (avoiding contamination of the copra with off-gases) prevents PAH contamination. JECFA (Joint FAO/WHO Expert Committee on Food Additives) recommends replacing direct drying by indirect drying. In case of direct heating, Good Manufacturing Practices recommend not to use waste products as a fuel for direct drying. Temperature and time should be controlled to avoid PAH formation. The equipment has to be kept clean and well maintained.
- dioxin	C					Plantations dry copra on open fires, a source of dioxin contamination for the copra.	Code of Practice for the prevention and reduction of dioxin and dioxin-like PCB contamination in foods and feeds (Codex CAC/RCP 62-2006).		Waste products must not be used as a fuel for direct drying.
- mineral oil	C					Copra being dried across roads may pick up spilled mineral oil.			
Aflatoxins	C					Aflatoxins may be formed when copra is not sufficiently dried.	EC Regulation No. 165/2010 limits aflatoxin B1 in copra and products derived thereof intended for direct human consumption or use as an ingredient in foodstuffs to 2 µg/kg and the sum of B1, B2, G1 and G2 to 4 µg/kg.		FEDIOL advocates sun drying or (preferably) indirect drying of copra till a moisture content of max 6%.

* Assessment of risks in this part of the chain is out of the scope of this document. See the methodology document paragraph 2.3 for more information.

3. Pressing or extraction of copra*

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Toxic compounds from hexane	C					Some coconut oil mills use hexane as an extraction solvent for crude oil. Industrial hexane may contain toxic compounds.			Hexane for oil extraction must be of food grade quality Directive 2009/32 sets purity criteria for the use of hexane in the production of foodstuffs..
Hydraulic oils or lubricants from failing equipment	C					Hydraulic oils and lubricants may contain toxic compounds.			Contamination of the product with non-food grade hydraulic oils or lubricants have to be strictly avoided, for example by recording of the quantities used. The risk of contamination of the product with food grade hydraulic oils and lubricants should be minimised.
Foreign bodies	P					Foreign bodies may be present.			A system should be in place that removes any foreign material.
Recycling of contaminated fat from fat traps in effluent water	C					Effluent water may be chemically contaminated.			Fat from fat traps in effluent water must have a non-food, non-feed destination except in case of dedicated process water fat taps.

* Assessment of risks in this part of the chain is out of the scope of this document. See the methodology document paragraph 2.3 for more information.

3.1. Production of crude coconut oil*

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
PAHs	C					Concentration of PAHs in crude coconut oil during pressing of the copra.	FOSFA has an optional allowance scheme for crude coconut oil for BaP levels exceeding 50 µg/kg.		
Dioxin	C					A potential source of dioxin contamination is direct drying of the copra.			
Mineral oils	C					Copra being dried across roads may pick up spilled diesel, which will concentrate in the crude oil during the pressing of the oil.			
Aflatoxins	C					When improperly dried copra is stored for several days aflatoxin may be formed. Rainfall during storage and transport will accelerate the formation of aflatoxins. Some pick up by crude coconut oil during pressing of the copra.			
Residues of herbicides, insecticides, fungicides or rodenticides above the MRL	C					Hitherto no residues of pesticides have been detected in crude coconut oil.	EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products.		

* Assessment of risks outside the EU is out of the scope of this document. See the methodology document paragraph 2.3 for more information.

Risk assessment of the chain of coconut oil products

Utilities: coconut oil refining and processing									
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Hydraulic oils or lubricants from equipment	C	low	high	3	PRP	Hydraulic oils and lubricants may contain toxic compounds.		The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used.	
Quality of water	C	low	high	3	PRP	Water is used in the crushing and refining process.		Apply water of suitable quality.	
Cleaning agents and boiler chemicals	C	medium	medium	3	PRP	Cleaning agents and steam (using boiler chemicals) come into contact with the product.		Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry.	
Thermal heating fluids (THF) from equipment	C	medium	high	4	CCP	THF may still be used by non-FEDIOL members.	According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed*.	Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided.	

4. Refining

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Processing aids	C	medium	medium	3	PRP	Processing aids come into contact with the product.		Processing aids that directly come into contact with the oil must be for food use or of food grade quality.	
PAHs	C	high	high	4	CCP	Crude coconut oil may be heavily contaminated with PAHs due to bad drying practices.	EC Regulation No. 1881/2006 sets a 2.0 µg/kg limit for BaP in oils and fats intended for direct human consumption or use as an ingredient in foods.	Use of active carbon to verify compliance with EU legislation.	
Dioxin and dioxin-like PCBs	C	low	high	3	PRP	A potential source of dioxin contamination for the oil is drying of copra and bleaching earth. Nevertheless, the dosage level of bleaching earth during refining is only 1-3%.	EC Regulation No. 1881/2006, for vegetable fats and oils sets a dioxin limit of 0.75 ng/kg (WHO-PCDD/F-TEQ) and one for the sum of dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ). FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value.	Source fresh bleaching earth from suppliers that fulfil the FEDIOL specifications on fresh bleaching earth.	
Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.	C	low	medium	2		Hitherto no residues of pesticides have been detected in crude coconut oil.	EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products.		
Adventitious presence of allergens (from lecithin, peanuts, nuts, sesame seeds and products thereof)	C	low	high	3	PRP	Potential cross contamination. Allergic reactions may occur at very low levels.	Directive 2000/13/EC as amended by Directive 2003/89/EC requires the mandatory labelling of ingredients known to trigger allergies or intolerances. FEDIOL Code of Practice on the production and labelling of certain oils in connection with allergy.	Prerequisite programme to prevent cross contamination.	

Risk assessment of the chain of coconut oil products

Aflatoxins	C	very low	high	2		Crude coconut oil may be contaminated with traces of aflatoxin.	EC Regulation No 165/2010 limits aflatoxin B1 in copra and products derived thereof intended for direct human consumption or use as an ingredient in foodstuffs to 2 µg/kg and the sum of B1, B2, G1 and G2 to 4 µg/kg.	Validate refining process for aflatoxin removal.	Aflatoxins will disappear under normal refining conditions.

5. Modification (general)

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Foreign materials like glass, wood, metals, etc.	P	medium	medium	3	PRP	Foreign materials may be present.		Filter before loading.	
Processing aids	C	medium	medium	3	PRP	Processing aids come into contact with the product.		Processing aids that directly come into contact with the oil must be for food use or of food grade quality.	

Inside EU			5.1. Hydrogenation						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contamination with high nickel levels	C	medium	medium	3	PRP	Nickel used as a catalyst is incompletely removed after filtration.		Proper post-refining or post-bleaching.	

Inside EU			5.2. Interesterification						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
No hazards in addition to those listed under 5. Modification (general)									

Risk assessment of the chain of coconut oil products

6. Loading of refined products									
HAZARD	**CAT.**	**CHANCE**	**SERIOUSNESS**	**RISK CLASS.**	**PRP or CCP**	**JUSTIFICATION**	**LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS**	**CONTROL MEASURE**	**REMARKS**
Foreign matter	P	low	high	3	PRP	Foreign bodies may be present.	FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Filter before loading. A quality plan should require the loading of tank cars with refined oils under a roof.	
Microbiological contamination	B	low	medium	2		Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow.		High-care zone.	
Misuse of additives	C	low	medium	2		Misuse or overdosing of additives may occur.	Directive 89/107/EEC.		
Adventitious presence of allergens (from lecithin, peanuts, nuts, sesame seeds and products thereof)	C	low	high	3	PRP	Potential cross contamination. Allergic reactions may occur at very low levels.	Directive 2000/13/EC as amended by Directive 2003/89/EC requires the mandatory labelling of ingredients known to trigger allergies or intolerances. FEDIOL Code of Practice on the production and labelling of certain oils in connection with allergy.	Prerequisite programme to prevent cross contamination.	

Risk assessment of the chain of coconut oil products

A. Transport outside EU*

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Microorganisms	B					Due to residual water in a tank.			
Contamination by previous cargoes	C					Tank cars and barges may have been used for non-food approved products such as petrochemicals.			Tank cars and barges that are not dedicated to the transport of foodstuff should have undergone a proper cleaning procedure.
Contamination by cleaning agents	C					Increased risk at cleaning stations that clean both food and chemical tanks at one site. In Indonesia and Malaysia few cleaning stations exist. However, those that exist may have limited facilities and may also be used for cleaning non-food tank cars. Used cleaning water may be re-used.			Cleaning agents must be suitable for use in the food industry.
Heating or cooling fluids from failing equipment									
- Tank cars	C					The tanks are heated with cooling water from the motor through a system of double walls (and not internal coils).			Use of tank cars that use coils for heat transfer should be banned. Instead tanks that are equipped with double walls have to be used.
- Barges	C					Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.			If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. The use of hot water or steam heating is recommended.
Adulteration	C/P/B					Adulteration can cause harm.	FEDIOL Code of Practice on Sampling and Analysis of all imported crude vegetable oils in bulk by ship into the EU.		Proper sealing system should be applied.

* Assessment of risks in this part of the chain is out of the scope of this document. See the methodology document paragraph 2.3 for more information.

Risk assessment of the chain of coconut oil products

B. Transport inside EU

HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	PRP or CCP	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Microorganisms	B	Low	high	3	PRP	Residual water in a tank can make microorganisms grow.		Control drying process after cleaning.	
Contamination by previous cargo									
- Tank cars, rail tanks and barges	C	low	high	3	PRP	Transport of oils is foodstuff dedicated	EU Regulation No. 852/2004 implies the transport of liquid foodstuffs by tank cars, rail tanks and barges to be dedicated. FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining.	
- Tank coasters	C	low	high	4	PRP	Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.	Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining.	
Contamination by cleaning agents									
- Tank cars, rail tanks and barges	C	low	medium	2		Increased risk at cleaning stations that clean both food and chemical tanks on one site.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Include safeguards to preclude contamination of the food grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks.	FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks.
- Tank coasters	C	low	medium	2		Increased risk in case coaster is not dedicated to foodstuff.		Selected cleaning stations must have an implemented HACCP-system. Demand a signed cleaning certificate before loading.	

Risk assessment of the chain of coconut oil products

B. Transport inside EU (continued)									
HAZARD	**CAT.**	**CHANCE**	**SERIOUSNESS**	**RISK CLASS.**	**PRP or CCP**	**JUSTIFICATION**	**LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS**	**CONTROL MEASURE**	**REMARKS**
Heating or cooling fluids from failing equipment									
- Tank cars	C	low	high	3	PRP	Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils).	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.		
- Rail tanks, tank barges and coasters	C	low	high	3	PRP	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.	FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Heating coils of rail tanks must be of stainless steel (FEDIOL). If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary.	
Foreign bodies	P	low	high	3	PRP			A quality plan should require the loading of tank cars with refined oils under a roof.	FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for loading and unloading.
Adulteration	C/P/ B	low	high	3	PRP	Adulteration can cause harm.	FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Sealing of tanks where possible.

Risk assessment of the chain of coconut oil products

C. Storage									
HAZARD	**CAT.**	**CHANCE**	**SERIOUSNESS**	**RISK CLASS.**	**PRP or CCP**	**JUSTIFICATION**	**LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS**	**CONTROL MEASURE**	**REMARKS**
Contamination due to lack of segregation (contamination from previous cargoes, use of incorrect joining, shared equipment)	C	low	high	3	PRP	This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs.	Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EU Regulation No. 852/2004).	Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC.	
Contamination by cleaning agents	C	low	high	3	PRP	This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using food approved cleaning agents. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low.		Cleaning agents must be suitable for use in the food industry.	
Solvent from coating	C	low	high	3	PRP	Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining		Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD	
Misuse of additives	C	low	high	3	PRP	Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved.		Agree on clear specifications as regards use of additives	**Misuse of additives**
Thermal heating fluids from failing equipment	C	low	high	3	PRP	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low.		If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary.	The use of water and steam heating is recommended.

Risk assessment of the chain of coconut oil products

D. Transport by ocean going vessel									
HAZARD	**CAT.**	**CHANCE**	**SERIOUSNESS**	**RISK CLASS.**	**PRP or CCP**	**JUSTIFICATION**	**LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS**	**CONTROL MEASURE**	**REMARKS**
Transport contamination - Contamination by previous cargoes that is present in tanks or pipes	C	medium	medium	3	PRP	Ocean going vessels carrying oils and fats for edible use into the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC.	Directive 96/3/EC (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked. FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats. FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.	Before loading, FOSFA recognised superintendents need to check whether tanks are sufficiently cleaned. Before unloading, FOSFA recognised superintendents need to check the ship's logbook on compliance with previous cargo lists. The use of dedicated pipe lines at loading and unloading.	
- Contamination by cleaning agents	C	low	high	3	PRP	Usually maritime business sticks to good practice.		Check ship log-book.	
Solvent from coating	C	low	high	3	PRP	Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining		Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD	
Thermal heating fluids (THF) from failing equipment	C	low	high	3	PRP	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.		If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary.	The use of water and steam heating is recommended.
Hydraulic oils from failing portable pumps	C	low	high	3	PRP	Hydraulic oils from portable pumps may be toxic.		The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used.	Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure.