Whole Foods Market, Private Label
Packaging Standards and Details

INTRODUCTION

Welcome to the Whole Foods Market Packaging Standards Guidebook. The following pages contain an alphabetized list of materials used for packaging as they relate to environmental sustainability.

The purpose of this document is to illustrate our commitment to sustainable packaging, and to set guidelines for vendors packing our Private Label products.

The criteria are based on recyclability, carbon footprint, and sustainability of raw materials, among others. In some cases a packaging material may be acceptable only in certain situations where no suitable substitutes exist, or may be acceptable only if does not include certain ingredients. Some materials require certain circumstances (such as partnership with a sustainability certifying agency), in order to be approved.

Each material will receive a letter grade. The specific designations are outlined below:

	A grade of 'A' is designated to any material which is approved for use in any situation without necessitating special certification or classification.
	A grade of 'B' is for packaging materials that are approved for use, but recommend a certification, such as paper products from the Forest Stewardship Council.
	A grade of 'C' is usually given to packaging materials for which there is a simple, more sustainable substitute, or requires some specific properties to deem it approved for use. This category requires the most attention and modification in order to be used in packaging applications.
	A grade of 'D' is allocated to those materials which are not approved for use at this time, but future iterations may be considered if technology can overcome the reasons they were not approved.
	A grade of 'F' is designated for those materials (or ingredients/additives) which have been deemed unsafe by the EPA, FDA or other governing body. These will never be permitted for use, and any existing products packaged in these materials are in the process of being eliminated.

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ALUMINUM

Standard: Aluminum is an acceptable material for use in packaging. Preference will be given to suppliers with a VAIP partnership, and the highest amount of post-consumer recycled material. Additional factors will include: can design for material savings, internal coating components and application method, facility location relative to product manufacturing, secondary and tertiary packaging details and cost.

Details: About one half of all aluminum products are made from post-consumer aluminum which uses only 5% of the energy used to make the ingot from virgin materials, and it uses 10% of the capital equipment.

Non-recycled aluminum originates as an oxide called alumina made from bauxite. Because aluminum itself does not occur in nature as a metal, the processing of aluminum took a giant leap forward with the advent of electricity.

Deposits of bauxite ore are mined and refined into alumina—one of the feedstocks for aluminum metal. Then alumina and electricity are combined in a cell with molten electrolyte called cryolite. Direct-current electricity is passed from a consumable carbon anode into the cryolite, splitting the aluminum oxide into molten aluminum metal and carbon-dioxide.

Between materials recovery and ongoing innovative research and development efforts, the industry is constantly searching for ways to reduce the amount of electricity used in aluminum production—and thus the related emissions and costs.

The worldwide alumina industry produces more than 70 million dry metric tons of bauxite residue annually. Australia is the largest alumina refiner in the world, processing nearly one-third of the global total.

During the smelting process perfluorocarbon (PFC) is released into the atmosphere. PFCs are potent greenhouse gases, characterized by strong infrared radiation absorption and relative inertness in the atmosphere. To combat this issue, the United States Environmental Protection Agency created the Voluntary Aluminum Industry Partnership (VAIP). VAIP partners work towards reduced PFC emissions.

The following companies have signed up as a VAIP partner:

Alcan Primary Metals Group, Sebree Works
Alcoa Inc.
Aluminum Association
Century Aluminum Company of Kentucky
Century Aluminum Company of West Virginia
Columbia Falls Aluminum Company
Golden Northwest Aluminum
Kaiser Aluminum
Noranda Aluminum Inc.

ALUMINUM FOIL/LAMINATE

Standard: Aluminum Foil and Aluminum Laminate are acceptable materials for use in packaging. Preference will be given to suppliers with a VAIP partnership, and the highest amount of post-consumer recycled material. Additional factors will include: design for material savings, facility location relative to product manufacturing, secondary and tertiary packaging details and cost.

Details: Aluminum foil is a very versatile packaging material. It is relatively inexpensive and provides an absolute barrier to light, moisture, and oxygen. Laminated to paper or plastic films for strength, foil provides lighter, less-expensive protection to foods, medicines, and other products that would be damaged by the environment.

Foil is produced by passing aluminum between rolls under pressure. Foil is less than 0.006 inch thick. It is produced from sheet coils that are heated and then passed through high-speed foil rolling mills.

Foil is shiny on only one side because as it passes through the final foil mill, two thicknesses of foil are rolled together. The sides facing each other emerge with the dull finish, while the sides in contact with the foil mills come out shinier—due to the burnishing effect of the rollers.

Flexible packaging and foil containers account for about three-fourths of all foil used.

Here are some of the benefits of using foil:

- Formable: Great dead-fold characteristics for good performance on high-speed packaging lines.
- Corrosion Resistant: Natural oxide coating reduces corrosion.
- Impermeable: 0.001-inch foil and thicker is impermeable to moisture and oxygen; 0.00035-inch foil has a water vapor transmission rate of 0.02 grams or less per 100 square inches; vapor transmission drops to zero when 0.00035-inch foil is laminated to an appropriate film.
- Adaptable: Can be combined with virtually any other flexible packaging material.
- Not Absorbent: Will not absorb water or other liquids
- Opaque: Transmits no light.
- Sealable: Excellent dead-fold and adhesion to a wide variety of compounds.
- Non-Soluble: Will not combine with foods and other substances.
- Tasteless, Odorless: Imparts no detectable taste or odor to products.
- Hygienic: Sterile when heat-treated in production. Smooth metallic surface sheds most of the contaminants and moisture of sterilization.
- Recyclable: When not contaminated with food or oil, foil can be balled and recycled curbside everywhere.

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Alcoa Inc.
Aluminum Association
Century Aluminum Company of Kentucky
Century Aluminum Company of West Virginia
Columbia Falls Aluminum Company
Golden Northwest Aluminum
Kaiser Aluminum
Noranda Aluminum Inc.

CARTON BOARD (KRAFT/SBS)

Standard: Carton Board is accepted for use in packaging. Preference will be given to Kraft paper over SBS paper because it is typically unbleached and uses less energy in production. Any paper product used for packaging Private Label products should be unbleached. Additional priority will be given to carton board that comes from certified sustainably managed forests, such as those verified by the Forest Stewardship Council, and will bear the official logo on the package to promote consumer education.

Details: The **Kraft** process (also known as Kraft pulping or sulfate process) describes a technology for conversion of wood into wood pulp consisting of almost pure cellulose fibers. The process entails treatment of wood chips with a mixture of sodium hydroxide and sodium sulfide that break the bonds that link lignin to the cellulose.

Various byproducts containing hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and other volatile sulfur compounds are the cause of the malodorous air emissions characteristic for pulp mills utilizing the Kraft process. Outside the modern mills the odor is perceivable only during disturbance situations, for example when shutting the mill down for maintenance break. This is due to practiced collection and burning of these odorous gases in the recovery boiler along with black liquor. The sulfur dioxide emissions of the Kraft pulp mills are much lower than sulfur dioxide emissions from sulfite mills.

The process effluents are treated in a biological effluent treatment plant, which guarantees that the effluents are not toxic in the recipient.

Bleached paper board, also known as **solid bleached sulfate (SBS)** board, is a premium paperboard grade that is produced from a furnish containing at least 80% virgin bleached wood pulp. The major markets for SBS are folding cartons, milk and juice cartons, and disposable foodservice products.

The **Forest Stewardship Council** (**FSC**) is an international non-profit, multi-stakeholder organization established in 1993 to promote responsible management of the world's forests. Its main tools for achieving this are standard setting, independent certification and labeling of forest products. This offers customers around the world the ability to choose products from socially and environmentally responsible forestry.

FSC was established as a response to concerns over the state of the forest, globally. Half of the world's forests have already been altered, degraded, destroyed or converted into other land uses. FSC is the first worldwide certification system established for forests and forest products. This voluntary market driven mechanism can be regarded as one of the most important initiatives of the last decade to promote better forest management.

Forest management according to FSC's internationally recognized standards delivers environmental services to local and global communities, including clean air and water, and contributes to mitigating impacts of climate change. FSC directly or indirectly addresses issues such as illegal logging, deforestation and global warming and has positive impacts on economic development, environmental conservation, poverty alleviation and social and political empowerment. For more information visit: www.fsc.org

COMPOSTABLE PULP BOARD

Standard: Compostable board products made from tree-free alternatives such as plant fibers, especially waste fibers, are acceptable materials for use in packaging.

Details: Paper can be made from most any fibrous plant, not just from trees. The most common fiber feed-stocks are bagasse (sometimes spelled: begasse), which is a byproduct of sugar cane processing, bulrush (cattails), and palm fiber or any fibrous waste such as from banana or lemon harvesting.

Sugar cane yields about 30% usable fiber after it is processed to obtain sugars. The bagasse can be used for many purposes, but was most commonly burned for energy generation. It can also be turned into a paper product with high strength and water resistance. Currently, the 365 compostable picnic plates are made from this material.

Bulrush is an aquatic grass-like plant that has been used for weaving baskets and rugs since the dawn of man. More recently it has been pulped, and the fibers can be converted into a heavy paper. It is the container currently used in all WFM salad bars.

Palm fiber is similar to the other two materials, and all three, when sustainably harvested, are preferable to virgin or recycled paper.

The paper does have high fiber content, and can be recycled or composted. It must be composted, however, when contaminated with food.

It can be used in any paper or paperboard packaging application such as with cereal boxes, or overwrap for chocolate.

It does cost slightly more, but can be positioned as tree-free which will appeal to the consumer.

CORRUGATED BOARD

Standard: Corrugated board is an acceptable material for use in any packaging application though is most commonly used in tertiary packaging (i.e. the cardboard box used to transport product to the store). Preference will be given to the supplier with the highest post consumer recycled content, and the standard will be as close to 100% as the market allows at the time.

Details: Corrugated fiberboard is a paper-based construction material consisting of a fluted corrugated sheet and one or two flat linerboards. It is widely used in the manufacture of corrugated boxes and shipping containers. The corrugated medium and linerboard are made of paperboard, a paper-like material usually over ten mils (0.010 inch, or 0.25 mm) thick. Paperboard and corrugated fiberboard are sometimes called cardboard by non-specialists, although cardboard might be any heavy paper-pulp based board.

Corrugated board is manufactured on large high-precision machinery lines called Corrugators running at 500 lineal feet per minute or faster. The corrugated medium is usually a 26 lb/1000 sq ft (127 g/m^2) paperboard; higher grades are also available. It arrives to the corrugator on large rolls.

Common flute sizes are "A", "B", "C", "E" and "F" or microflute. The letter designation relates to the order that the flutes were invented, not the relative sizes. Flute size refers to the number of flutes per lineal foot, although the actual flute dimensions for different corrugator manufacturers may vary slightly. Measuring the number of flutes per lineal foot is a more reliable method of identifying flute size than measuring board thickness, which can vary due to manufacturing conditions. The most common flute size in corrugated boxes is "C" flute.

Mill and corrugator scrap, or broke, is the cleanest source for recycling. The high rates of post-consumer recycling reflect the efficiency of recycling mills to clean and process the incoming materials. Several technologies are available to sort, screen, filter, and chemically treat the recycled paper.

Materials which are more difficult to remove include wax coatings on corrugated boxes and adhesives. Many extraneous materials are readily removed. Twine, strapping, etc are removed from the hydropulper by a "ragger". Metal straps and staples can be screened out or removed by a magnet. Film-backed pressure sensitive tape stays intact: the PSA adhesive and the backing are both removed together

Mill and corrugator scrap, or broke, is the cleanest source for recycling. The high rates of post-consumer recycling reflect the efficiency of recycling mills to clean and process the incoming materials. Several technologies are available to sort, screen, filter, and chemically treat the recycled paper.

Our preferred supplier for corrugated boxes is Temple Inland, but boxes may be purchased from any supplier using a significant portion (>80%) of post-consumer materials. Additionally, a partnership with the Forest Stewardship Council is recommended for any paperboard source.

ETHYLENE VINYL ACETATE

Standard: ETHYLENE VINYL ACETATE (EVA) is NOT APPROVED for use as a packaging material due to its base material being reactive, flammable, carcinogenic in laboratory tests for long-term exposure and toxic to aquatic organisms, particularly fish. Substitutes include LDPE or HDPE.

Details: Ethylene Vinyl Acetate (EVA) is the copolymer of ethylene and vinyl acetate. The weight percent vinyl acetate usually varies from 10 to 40% with the remainder being ethylene

Vinyl acetate monomer (VAM) is an essential chemical building block used in a wide variety of industrial and consumer products. VAM is a key ingredient in emulsion polymers, resins, and intermediates used in paints, adhesives, coatings, textiles, packaging, et cetera...

Ethylene is a basic building block for the chemical industry, and it is one of the largest volume organic chemicals produced globally. It is the simplest of the family of hydrocarbons called olefins, which are characterized by a carbon-carbon double bond. Ethylene is produced commercially from petroleum and natural gas feedstocks. Ethylene is primarily used as a reactive monomer to make polyethylene, an acceptable packaging material.

The reason EVA is not approved for use is because of the VAM. VAM is considered to be slightly to moderately toxic to aquatic organisms, and highly toxic to fish. Animal studies found that long-term exposure to VAM can cause a carcinogenic response. The tumors observed in laboratory animals at very high exposure concentrations for their lifetimes are not considered to be of relevance to humans who are exposed to low concentrations under typical use conditions. Even if the risk is low, EVA should not be used since there are many alternatives that do not contain the chemical compound in question, VAM.

Glass

Standard: Glass (Amber, Green, Clear, Other) is acceptable for use as a packaging material.

Details: Glass is usually made from SiO_2, but usually has several additives that make it melt more easily, or increase its strength. There are also ways to make silicon-free glass for use in different applications.

Glass is very easily recyclable. Used glass packaging materials, usually bottles, can be turned back into bottles almost infinitely without quality issues. It is accepted in every curbside recycling program in the nation, and unlike plastic there is no consumer confusion about glass recycling like exists with plastics.

One potential down side to glass is that it is heavier so it uses more fuel to transport. Although measures can be taken to offset the emissions, there may be some situations where plastic is a more sustainable material, but this is evaluated on a case-by-case basis. Generally, glass will be given preference to plastic due to its recyclability back into a useful product.

METALLIZED FILM

Standard: Metallized (or 'metallised') films, when the film is Polyethylene (XXPE or PET), are acceptable but not preferred, and when the film is Poly vinyl Chloride it is NOT acceptable.

Details: Metallization is performed using a physical vapor deposition process. Aluminum is the most common metal used for deposition, but other metals such as nickel or chromium are also used. The metal is heated and evaporated under vacuum. This condenses on the cold polymer film, which is unwound near the metal vapor source. This coating is much thinner than a metal foil could be made, in the range of 0.5 microns. This coating will not fade or discolor over time. While oriented polypropylene and PET are the most common films used for metallization, nylon, polyethylene and cast polypropylene are also used.

Metallized films have a reflective silver surface similar to aluminum foil. The coating also reduces the permeability of the film to light, water and oxygen. The properties of the film remain, such as higher toughness, the ability to be heat sealed, and a lower density at a lower cost than an aluminum foil. This gives metallized films some advantages over aluminum foil and aluminum foil laminates. It was thought that metallized films would become a replacement for aluminum foil laminates, but current films still cannot match the barrier properties of foil.

Metallized films were first used for decorative purposes as Christmas tinsel, and continue to be used for items such as wrappers and ribbons. The metallic helium filled novelty balloons given as gifts are made of metallized PET.

Both metallized PET and PP have replaced foil laminates for products such as snack foods, coffee and candy, which do not require the superior barrier of aluminum foil. Metallized nylon and polyethylene are used in the meat export market.

Many food items are also packaged using metallized films for appearance only, as these produce a package with greater sparkle when compared to competing products that use printed paper or polymer films.

Metallized films are not accepted for recycling in any curbside program in the nation. Their end of life is the landfill. They are, however, the industry standard for many packages such as potato chips, and energy bars. For this reason they are acceptable, but as technology improves for other, recyclable materials, this standard may change.

PVC is NOT accepted for use in any Private Label product packaging. For more information on PVC, reference the PVC guideline page in this document.

NYLON

Standard: Nylon is acceptable but not preferred for use in packaging. It is most commonly found in lids for plastic (PET) bottles, and as a film overwrap.

Details: Nylon is a thermoplastic silky material, first used commercially in a nylon-bristled toothbrush (1938), followed more famously by women's "nylons" stockings (1940). It is made of repeating units linked by peptide bonds (another name for amide bonds) and is frequently referred to as *polyamide* (PA). Nylon was the first commercially successful polymer and the first synthetic fiber to be made entirely from coal, water and air. These are formed into monomers of intermediate molecular weight, which are then reacted to form long polymer chains.

Nylon was intended to be a synthetic replacement for silk and substituted for it in many different products after silk became scarce during World War II. It replaced silk in military applications such as parachutes, flak vests, and was used in many types of vehicle tires.

Nylon fibers are used in a great many applications, including fabrics, bridal veils, carpets, musical strings and rope.

Solid nylon is used for mechanical parts such as gears and other low- to medium-stress components previously cast in metal. Engineering grade nylon is processed by extrusion, casting, and injection molding. Type 6/6 Nylon 101 is the most common commercial grade of nylon, and Nylon 6 is the most common commercial grade of cast nylon. Nylon is available in glass-filled and molybdenum sulfide-filled variants which increase structural and impact strength and rigidity or lubricity.

Because nylon is synthetic fiber from a non-petroleum base, it is not accepted for recycling anywhere. Because suitable substitutes exist, it is preferred to find an alternative material for use in packaging.

PAPER/PAPER BOARD

Standard: Paper and Paper Board are acceptable materials for use in Private Label packaging, however preference will be given to the highest proportion of recycled content, and paper from certified sustainable feedstocks such as those verified by the Forest Stewardship Council (FSC).

Details: Though paper can be made from virgin trees, there are also many other sources which are considered preferred for use in Private Label products. Private Label packaging quality standards will eventually classify 100% virgin paper as an unacceptable material due to the volume of sustainable options which are readily available, most of which with no or very little cost increase.

Preferred materials will be those with the most post-consumer recycled content, striving for 100% overall recycled content and at least 40% post-consumer.

Even more preference will be given to papers made from non-tree feedstocks. These include alternate fibers such as banana leaves, hemp, limestone and other agricultural waste. Some of these options will result in a cost increase from tree-based paper, and should be used in WFM exclusive items with clear messaging about the fiber on the label. This should help to drive sales compared to other products on the shelf with more conventional packaging.

The virgin fiber content of recycled paper packages should come from FSC certified forests.

Additionally, the labeling of all paper/paper board products will include recycled content information as well as recycling instructions, and any certifications such as FSC.

POLYCARBONATE/#7

Standard: Polycarbonate plastic will only be approved for use in packaging if it is thoroughly tested, and is proven to not contain Bisphenol A as an ingredient in the formula.

Details: Polycarbonate may be appealing to manufacturers and purchasers of food storage containers due to its clarity and toughness, being described as lightweight and highly break resistant particularly when compared to silica glass. Polycarbonate may be seen in the form of single use and refillable plastic water bottles.

More than 100 studies have explored the bioactivity of Bisphenol A leachates from polycarbonates. Bisphenol A appeared to be released from polycarbonate animal cages into water at room temperature and that it may have been responsible for enlargement of the reproductive organs of female mice.

An analysis of the literature on Bisphenol A leachate low-dose effects by Vom Saal and Hughes published in August 2005 seems to have found a suggestive correlation between the source of funding and the conclusion drawn. Industry funded studies tend to find no significant effects while government funded studies tend to find significant effects.

Research by Ana M. Soto, professor of anatomy and cellular biology at Tufts University School of Medicine, Boston, published Dec. 6 in the online edition of Reproductive Toxicology (DOI: 10.1016/j.reprotox. 2006.10.002) describes exposure of pregnant rats to Bisphenol A at 2.5 to 1,000 µg per kilogram of body weight per day. At the equivalent of puberty for the pups (50 days old), about 25% of their mammary ducts had precancerous lesions, some three to four times higher than unexposed controls. The study is cited as evidence for the hypothesis that environmental exposure to Bisphenol A as a fetus can cause breast cancer in adult women.

An expert panel of 12 scientists has found that there is "some concern that exposure to the chemical Bisphenol A in utero causes neural and behavioral effects," according to the draft report prepared by The National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction.

For the general adult population, the expert panel found a "negligible concern for adverse reproductive effects following exposures."

One point of agreement among those studying polycarbonate water and food storage containers may be that using sodium hypochlorite bleach and other alkali cleaners to clean polycarbonate is not recommended, as they catalyze the release of the Bisphenol A. The tendency of polycarbonate to release Bisphenol A was discovered after a lab tech used strong cleaners on polycarbonate lab containers. Endocrine disruption later observed on lab rats was traced to exposure from the cleaned containers.

On April 18, 2008, Health Canada announced that Bisphenol A is "'toxic' to human health". Canada is the first nation to make this designation.

POLYETHYLENE

Standard: All Polyethylene products (High Density, Low Density, Linear Low Density and Medium Density) are acceptable for use in packaging and tertiary overwrap.

Details: Ethylene, the base material for polyethylene, is produced commercially from petroleum and natural gas feedstocks.

Ethylene is primarily used as a reactive monomer (chemical building block) to make polyethylene, and as an intermediate in the production of other organic compounds, such as ethylene dichloride and ethylene oxide. Products produced from ethylene are used to make chemicals and plastics, and are used in other industrial processes and in consumer products such as detergents, automotive antifreeze, and plastic articles of many types.

Ethylene exists naturally in the environment where it is produced by vegetation and other natural sources. It is also a combustion product from natural and anthropogenic sources such as motor vehicle exhaust, forest fires, and cigarette smoke. Ethylene is used industrially in the production of various plastics and chemicals used in industrial and consumer products. For example, plastic milk jugs and plastic bags are made from HDPE, which is a polymer made from ethylene.

Ethylene is naturally present in the environment, and the highest environmental concentrations are found in urban areas. It is produced by natural sources, such as: vegetation of all types; agricultural wastes and refuse; forest fires and cigarette smoke; and the incomplete combustion of fossil fuels (automobile exhaust), which is thought to account for higher urban concentrations. Because ethylene is primarily produced by natural sources and present in ambient air, the general public is exposed to very low concentrations of ethylene. Ambient ethylene concentrations can vary, but are typically less than 0.5 ppm, as determined by air samples taken from U.S. cities.

PE films can be recycled at any WFM location, but are not accepted by municipal recycling companies in most areas. Recycling information should be included on the label.

HDPE (#2) containers, such as milk jugs and shampoo bottles, are accepted everywhere for recycling, and this information should be included on the label.

POLYETHYLENE TEREPHTHALATE (PET)

Standard: Polyethylene Terephthalate (PET), is acceptable as a material for use in packaging.

Details: Depending on its processing and thermal history, it may exist both as an amorphous (transparent) and as a semi-crystalline (opaque and white) material. PET can be semi-rigid to rigid, depending on its thickness, and is very lightweight. It makes a good gas and fair moisture barrier, as well as a good barrier to alcohol (requires additional "Barrier" treatment) and solvents. It is strong and impact-resistant. It is naturally colorless with high transparency.

While all thermoplastics are technically recyclable, PET bottle recycling is more practical than many other plastic applications. The primary reason is that plastic carbonated soft drink bottles and water bottles are almost exclusively PET which makes them more easily identifiable in a recycle stream. PET has a resin identification code of 1. PET, as with many plastics, is also an excellent candidate for thermal recycling (incineration) as it is composed of carbon, hydrogen and oxygen with only trace amounts of catalyst elements (no sulfur) and has the energy content of soft coal.

One of the uses for a recycled PET bottle is for the manufacture of polar fleece material. It can also make fiber for polyester products.

An area of recent concern is with the addition of Antimony trioxide (Sb_2O_3), a catalyst that is often used in the production of PET. It remains in the material and can thus in principle migrate out into food and drinks. Although antimony trioxide is of low toxicity, its presence is still of concern. The Swiss Federal Office of Public Health investigated the amount of antimony migration, comparing waters bottled in PET and glass: the antimony concentrations of the water in PET bottles was higher, but still well below the allowed maximal concentrations. The Swiss Federal Office of Public Health concluded that small amounts of antimony migrate from the PET into bottled water, but that the health risk of the resulting low concentrations is negligible (1% of the "tolerable daily intake" determined by the WHO). A later (2006) but more widely publicized study by a group of geochemists at the University of Heidelberg headed by William Shotyk found similar amounts of antimony in water in PET bottles.

Preference will be given to PET producers who do not use Antimony trioxide as a catalyst.

Since PET is universally accepted by recycling programs recycling information will be included on the label.

PET may not be the best material for every application. In some cases, glass may be suggested as a substitute, and bottle design for reduction in overall materials will be recommended.

POLYLACTIC ACID (PLA)

Standard: Polylactic Acid(PLA) is a biodegradable, thermoplastic, aliphatic polyester derived from renewable resources such as corn starch(in the U.S.) or sugarcanes (rest of world). It is NOT approved as a packaging material.

Details: PLA is useful as a packaging material because it has properties similar to certain types of petroleum based plastics. It is clear, rigid, and can be formed on practically any machine that forms plastic leading to a vast array of applications. It tolerates cold and heat fairly well, and protects products from moisture and air.

Despite its positive attributes, the feedstock of PLA is most often corn starch which raises several concerns. The first consideration is the issue of using genetically modified (GM) corn. After working with the makers of PLA it has been deemed impossible to create a line of products from organic corn, or otherwise GM free. Genetic modification is to be treated with caution because it is nascent, and the long-term effects on humans who consume GM products, as well as the health of the surrounding crops and biodiversity, remain unanswered yet important considerations.

A second issue is that corn is a food crop. Removing edible product from the food supply raises ethical concerns. This process has also been demonstrated to raise prices for corn resulting in corn-based foods to be at such a high cost as to render them unattainable to low-income people, especially in developing countries.

Generally speaking, corn requires a lot of inputs such as fertilizers, and water. It also needs to be rotated to limit harm to farm lands. This year corn as a crop is being grown on almost 25% more land than last year at the expense of other crops. This monoculture is harmful to the land and to biodiversity.

For these reasons, as well as the lack of a composting infrastructure, PLA will be avoided until such a time that it can be made from waste products and not from an energy-intensive food product.

POLYPROPYLENE (PP)

Standard: Polypropylene (PP, #5), is accepted for use as a packaging material for certain applications, but #1 PET and #2 HDPE may be suggested as alternatives.

Details: Polypropylene is a thermoplastic polymer, made by the chemical industry and used in a wide variety of applications, including packaging, textiles (e.g., ropes, thermal underwear and carpets), stationery, plastic parts and reusable containers of various types, laboratory equipment, loudspeakers, automotive components, and polymer banknotes. An addition polymer made from the monomer propylene, it is rugged and unusually resistant to many chemical solvents, bases and acids. Melt processing of polypropylene can be achieved via extrusion and molding. Its resin identification code is:

Common extrusion methods include production of melt blown and spun bond fibers to form long rolls for future conversion into a wide range of useful products such as face masks, filters, diapers and wipes.

The most common uses for PP in packaging come in dairy products such as yogurt and margarine tubs. It is also found in complex shapes such as bottle lids and some films like labels and bags.

PP is accepted by municipal recycling facilities in many communities, and is relatively easy to recycle. PP can become clothing, bottles, tote bags or rigid products like toothbrush handles.

Because #1 and #2 plastics are still more commonly accepted, the PP will be evaluated on a case-by-case basis, and in some cases it will be recommended that another resin is used in place of PP.

POLYSTYRENE (PS)

Standard: Polystyrene (PS, #6) is being totally phased out of private label, and no new products will be permitted to be sold in PS packaging. Furthermore, all existing PS packaging will be out of our stores by 2010.

Details: Polystyrene is an aromatic polymer made from the aromatic monomer styrene, a liquid hydrocarbon that is commercially manufactured from petroleum by the chemical industry. PS is a thermoplastic substance, normally existing in solid state at room temperature, but melting if heated (for molding or extrusion), and becoming solid again when cooling off.

Polystyrene's most common use is as expanded polystyrene (EPS). Expanded polystyrene is produced from a mixture of about 90-95% polystyrene and 5-10% gaseous blowing agent, most commonly pentane or carbon dioxide. The solid plastic is expanded into a foam through the use of heat, usually steam.

The resin identification code symbol for polystyrene is  . However, the majority of polystyrene products are currently not recycled because of a lack of suitable recycling facilities. Furthermore, when it is "recycled," it is not a closed loop — polystyrene cups and other packaging materials are usually recycled into fillers in other plastics, or other items that cannot themselves be recycled and are thrown away.

Benzene, a material used in the production of polystyrene, is a known human carcinogen.

The EPA claims:

"Styrene is primarily used in the production of polystyrene plastics and resins. Acute (short-term) exposure to styrene in humans results in mucous membrane and eye irritation, and gastrointestinal effects. Chronic (long-term) exposure to styrene in humans results in effects on the central nervous system (CNS), such as headache, fatigue, weakness, and depression, CSN dysfunction, hearing loss, and peripheral neuropathy. EPA has not given a formal carcinogen classification to styrene."

Expanded polystyrene is not easily recyclable because of its light weight and low scrap value. It is generally not accepted in curbside programs. Expanded polystyrene foam takes 900 years to decompose in the environment and has been documented to cause starvation in birds and other marine wildlife. According to the California Coastal Commission, it is a principal component of marine debris. A CIWMB (California Integrated Waste Management Board) report finds that “in the categories of energy consumption, greenhouse gas effect, and total environmental effect, EPS’s environmental impacts were second highest, behind aluminum.” Restricting the use of foamed polystyrene takeout food packaging is a priority of many solid waste environmentalist organizations, like Californians Against Waste.

The city of Berkeley, California was one of the first cities in the world to ban polystyrene food packaging (called Styrofoam in the media announcements). It was also banned in Portland, OR, and Suffolk County, NY in 1990. Now, over 20 US cities have banned polystyrene food packaging, including Oakland, CA on Jan 1st 2007. San Francisco introduced a ban on the packaging on June 1st 2007.

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POLY VINYL ACETATE (PVA)

Standard: POLY VINYL ACETATE (PVA) is NOT APPROVED for use as a packaging material due to its base material being reactive, flammable, carcinogenic in laboratory tests for long-term exposure and toxic to aquatic organisms, particularly fish. Substitutes include LDPE or HDPE.

Details: Poly Vinyl Acetate (PVA) is made from the monomer vinyl acetate.

Vinyl acetate monomer (VAM) is an essential chemical building block used in a wide variety of industrial and consumer products. VAM is a key ingredient in emulsion polymers, resins, and intermediates used in paints, adhesives, coatings, textiles, packaging, et cetera...

The reason PVA is not approved for use is because of the VAM. VAM is considered to be slightly to moderately toxic to aquatic organisms, and highly toxic to fish. Animal studies found that long-term exposure to VAM can cause a carcinogenic response. The tumors observed in laboratory animals at very high exposure concentrations for their lifetimes are not considered to be of relevance to humans who are exposed to low concentrations under typical use conditions. Even if the risk is low, PVA should not be used since there are many alternatives that do not contain the chemical compound in question, VAM.

POLYVINYL CHLORIDE (PVC)

Standard: Polyvinyl Chloride is NOT acceptable as either in direct product packaging, or as an overwrap during transport as it is toxic to plant workers, the environment and not easily recyclable. Alternatives in the package include other, recyclable plastics such as PET or HDPE, and LDPE for overwrap.

Details: Many vinyl products contain additional chemicals to change the chemical consistency of the product. Some of these additional chemicals called additives can leach out of vinyl products. Plasticizers that must be added to make PVC flexible have been an additive of particular concern.

Because soft PVC toys have been made for babies for years, there are concerns that these additives leach out of soft toys into the mouths of the children chewing on them. Additionally, other products geared towards adults have also been demonstrated to leach significant additives. In January 2006, the European Union placed a ban on six types of phthalate softeners, including DEHP (diethylhexyl phthalate), used in toys. In the USA most companies have voluntarily stopped manufacturing PVC toys with DEHP and in 2003 the US Consumer Product Safety Commission (CPSC) denied a petition for a ban on PVC toys made with an alternative plasticizer, DINP (diisononyl phthalate). In April 2006, the European Chemicals Bureau of the European Commission published an assessment of DINP which found risk "unlikely" for children and newborns.

In the late 1960s, Dr. John Creech and Dr. Maurice Johnson were the first to clearly link and recognize the carcinogenicity of vinyl chloride monomer to humans when workers in the polyvinyl chloride polymerization section of a B.F. Goodrich plant near Louisville, Kentucky, were diagnosed with liver angiosarcoma, a rare disease. Since that time, studies of PVC workers in Australia, Italy, Germany, and the UK have all associated certain types of occupational cancers with exposure to vinyl chloride. The link between angiosarcoma of the liver and long-term exposure to vinyl chloride is the only one that has been confirmed by the International Agency for Research on Cancer. All the cases of angiosarcoma developed from exposure to vinyl chloride monomer, were in workers who were exposed to very high VCM levels, routinely, for many years.

The environmentalist group Greenpeace has advocated the global phase-out of PVC because they claim dioxin is produced as a byproduct of vinyl chloride manufacture and from incineration of waste PVC in domestic garbage. The European Industry, however, asserts that it has improved production processes to minimize dioxin emissions. Dioxins are a global health threat because they persist in the environment and can travel long distances. At very low levels, near those to which the general population is exposed, dioxins have been linked to immune system suppression, reproductive disorders, a variety of cancers, and endometriosis.

As PVC has been proven to be deleterious to the health of plant workers, made from carcinogenic chemicals, and not recyclable it is unacceptable for use in any part of production, shipping or packaging for Whole Foods Market products.

STEEL/BISPHENOL A

Standard: Steel is acceptable as a material for packaging. Attention will be paid to the inner lining for cans which must not be made from Bisphenol-A unless no suitable alternative exists.

Details: Steel is an alloy consisting mostly of iron, with a carbon content between 0.2 and 2.04% by weight depending on grade. Carbon is the most cost-effective alloying material for iron, but various other alloying elements are used such as manganese, chromium, vanadium, and tungsten. Carbon and other elements act as a hardening agent, preventing dislocations in the iron atom crystal lattice from sliding past one another.

Bisphenol A (BPA) is a is an organic compound with the formula $(CH_3)_2C(C_6H_4OH)_2$. Containing two phenol functional groups, it is a difunctional building block to several important polymers and polymer additives. BPA has become controversial because it mimics estrogen and thus could induce hormonal responses.

Bisphenol A's current uses are numerous. It is used in the synthesis of polyesters, polysulfones, and polyether ketones, as an antioxidant in some plasticizers, and as a polymerization inhibitor in PVC. It is a key monomer in production of polycarbonate plastic and epoxy resins.

There is a lot of legal action currently underway against the manufacturers and distributors of products that contain BPA, especially when used to package food and formula for babies. The plaintiffs claim to represent all consumers, and are seeking injunctive relief and punitive damages based on allegations of consumer fraud and failure to warn about the potential risks.

Some studies show 95% of Americans have detectable levels of BPA in their bloodstreams. Environmental advocates claim that studies over the past 20 years show BPA to be not only a ubiquitous pollutant in the human body, but also a developmental toxin at low doses. Concerns have been expressed that BPA may pose risks for early puberty, prostate effects, breast cancer and behavioral impacts from early-life exposures.

Whole Foods Market customers are very concerned with this issue as demonstrated by the large volume of comments and questions received by the Global Headquarters.

Due to all these issues, alternatives to steel cans will be evaluated if the can must be lined with a BPA resin.

ASEPTIC CONTAINERS (TETRA PAK)

Standard: Multi-laminate, aseptic containers will be accepted for use for certain packaging applications on a case-by-case basis when suitable alternatives do not exist.

Details: Tetra Pak is the name of the company whose president invented the multi-laminated, germ-free (aseptic) package. It is a 6-layer package consisting of three materials: 75% paper, 20% low-density poly-ethylene, and 5% aluminum held together by adhesives.

The more complex the package, the more difficult to recycle. This package is very complex, and hence quite difficult to recycle. There are only a few facilities in the world with the capacity to recycle Tetra Paks. They must be collected and shipped to specific locations in Europe or South America. For this reason, many municipalities do not accept them in curb-side programs.

For some applications, such as shelf-stable milk, this container is the only suitable option. Its use is of particular importance in developing countries where refrigeration is uncommon. The use of this package will be evaluated for individual scenarios, but in most cases an alternative will be suggested.

For existing or obligatory use of the Tetra Pak aseptic carton the following message shall appear on the carton: “This package is recyclable. Check with your local recycling company to see if they are accepted in your area.”

The Tetra Pak corporation also makes carton board products including waxed cartons for cold milk. These are acceptable, but since Tetra Pak is FSC certified for some of their products only those will be permitted for use. Additionally, the FSC logo will appear on the other board products from Tetra Pak.