Diverting Car Seats from the Waste Stream

An Investigation into the Reuse and Recycling of Children's Car Seats

April 2015

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Old Car Seat, New Life

Report commissioned by Zero Waste Washington, produced by CoolMom, and funded through a grant from the Washington State Department of Ecology. While this report was reviewed for grant consistency, this does not necessarily constitute endorsement by Ecology.

About Old Car Seat, New Life

Old Car Seat, New Life is a joint project of CoolMom and Zero Waste Washington. We are working together to expand car seat reuse and recycling options for families in King County, Washington. Our goal is to create a more convenient and sustainable system for recycling children's car seats while supporting safe car seat reuse. We hope that our project will ultimately lead to design changes that will make car seats safer to use for longer periods of time and easier to recycle when their useful life is complete. Please visit www.recycleyourcarseat.org for more information.

CoolMom empowers families to respond to the climate crisis in practical and creative ways, and to influence their communities through their personal actions. CoolMoms and Dads reduce fossil fuel use, grow and eat climate-friendly diets, reduce consumption, and teach children to take action on behalf of the planet. CoolParents can be found at homes, schools, places of worship, workplaces and governments sharing ideas, teaching others how to implement changes, and advocating solutions that will safeguard the future.

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Zero Waste Washington is championing a responsible and comprehensive approach to the "stuff" we all use. We have been the catalyst for breakthrough recycling programs and policies in Washington for over 30 years. Our strategy of working both at the big-picture and community levels means a healthier, safer Washington and more equitable access to sound, responsible recycling for all its residents. We are the public's voice for zero waste.

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About the Authors

Kimberly Christensen has a degree in writing, a passion for saving the planet, and a history of working for mission-driven organizations. She has been part of CoolMom since its early days: developing curriculum for school use, writing newsletter and outreach pieces, and organizing events. She, along with co-author Brooke Doyle, has been working on creating a sustainable recycling path for car seats since 2009.

Brooke Doyle's career has been dedicated to protecting the special interests of children through teaching, curriculum development, and working to ensure a healthy planet for their future. She has been the coordinator of the North Seattle branch of CoolMom since 2008, and has been heavily involved in car seat recycling since 2009.

Statement of Purpose

This report was developed as a project of Old Car Seat, New Life, which is a joint program of CoolMom and Zero Waste Washington. By covering a range of related topics from safe car seat use to the basics of recycling, this report strives to provide the background information that is key for anyone to understand the issues that are unique to car seat reuse and recycling. However, it also delves deeper into the finer points of recycling mixed material items like car seats, with specific information learned from programs that are already involved in their recycling.

As the focus of the Old Car Seat, New Life program is regional, some of the information in this paper is specific to King County, Washington. However, much of the information covers the fundamentals of car seat use, reuse and recycling, which is not necessarily specific to location. The report includes information gathered from Canadian and American sources, and should be of use to a variety of parties, from recyclers to child passenger safety technicians, to individuals who are interested in helping solve the problem of car seats in the waste stream.

Executive Summary

Children's car seats pose a unique challenge to those who wish to divert them from the waste stream. Car seats are one of few items whose use is mandated by laws in every state. They are constructed of multiple materials, including rigid plastic, metal and foam, that are strongly bonded together in order to withstand significant impacts. Car seats can be rendered unusable through collisions and they expire as their components age. It is not safe to share them between children indefinitely, so their potential for safe reuse has a shelf life. They are finding their way into landfills and incinerators by the million.

Our investigation into creating options for greater reuse and recycling of children's car seats has led us to the following key findings and conclusions:

- In King County, Washington, the 25,032 babies that were born in 2012 will each use two or three car seats during the course of their childhoods.
- Parents and caregivers want to reuse and recycle their children's car seats.
- Safe reuse of car seats is possible if safety protocols are followed.
- While existing car seat recycling programs are scattered across the United States and Canada, their scale is not adequate to address the size of the need.
- Offering car seat recycling can be a tool for removing unsafe seats from general use. Child passenger safety technicians and hospitals may be drawn to car seat recycling because of this aspect.
- Car seats collection methods include: one day events, ongoing drop sites, mail-back programs and curbside collection.

- Several parts of the seats, including the covers, straps and soft comfort foam, currently lack recycling options. Most car seat recycling programs request that parents/caregivers remove and dispose of these non-recyclable components before bringing the car seat in for recycling.
- Once the non-recyclable components are removed, the remaining shell is comprised primarily of recyclable plastics and metal. Because of the design of many types of seats, dismantling them into their component parts is time-intensive. However, hand-dismantling results in highly effective separation and recovery of recyclable materials.
- As an alternative to hand-dismantling, some recyclers are using other processing techniques such as shredding the car seats or baling them with bulky rigid plastics. These methods need downstream due diligence to ensure that maximum recovery and the responsible downstream management of the materials are prioritized.
- The greatest obstacle to recycling is the design of the car seats, which varies greatly from manufacturer to manufacturer. While safety standards must be prioritized, consideration should also be given to designing with recycling in mind. Additionally, manufacturers should identify plastics whenever possible through the use of resin identification numbers (RIN).
- Prolonged testing and monitoring of car seats by manufacturers should be encouraged so that expiration dates can be extended when it's safe to do so.
- Dedicated and sustainable funding is essential to the success of recycling efforts. Extended producer responsibility for car seats would provide sustainable funding, thus ensuring that recycling is available for the 10 million car seats sold annually in this country.

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Introduction

Perhaps no single piece of baby gear is as ubiquitous as the car seat. State laws require that parents and caregivers secure a child into a car seat from birth through the age of eight or until they reach 4'9" in height. Hospital staff will not discharge a newborn until the parents demonstrate that they have a seat installed in their vehicle. Over the course of their lives children will use an average of three car seats: an infant/rear-facing seat, a convertible or forward-facing-only seat for toddlers and preschoolers, and a booster seat for older children. When used as intended, these seats play an important role in reducing crash-related morbidity and mortality among children from birth through age twelve.

Despite legal requirements which mandate the purchase and correct use of these seats, little thought has been given to the end-of-life waste generated by the estimated 10 million car seats sold each year in the United States (1). Even seats that are shared between children eventually expire and must be replaced. Additionally, any car seat that is involved in a moderate or significant automobile collision should not be re-used and thus, should be replaced, and safety recalls can affect millions of car seats. With car seats weighing in at approximately 15 pounds, the lack of recycling options results in an estimated 150 million pounds of plastic and metal making their way into landfills or incinerators annually in the United States.

In King County, Washington, the 25,032 babies that were born in 2012 will each use two or three car seats during the course of their childhoods (2). Without viable recycling options for those car seats, the plastic and metal contained within the seats will meet their end in a landfill, instead of being recovered and recycled. The cycle repeats with each successive year, with the car

seats that once protected children dumped into the waste stream because there are no better alternatives.

Safe reuse is equally challenging, as car seat safety experts generally discourage parents from reusing seats with unknown histories, in case the safety of those seats has been compromised by a crash. However, car seats are expensive, often making economics a barrier to child safety. Many hospitals provide lower-cost seats to families in need, but the demand for free seats outpaces the supply considerably. WestSide Baby, which runs an established program for car seat reuse in the Seattle area, reports that they receive two requests for free car seats for every one they are able to fulfill and that other service centers throughout the region report even greater demand (3).

Consumers of car seats want options for keeping their car seats out of the landfill or incinerator. Reuse-minded parents often donate them to child-centric nonprofits or secondhand stores. Others stash their seats in the garage, hoping that recycling will one day be available. As many as 300 unusable car seats have been collected in a single day at the few car seat recycling drives that have been held in King County (4). Consumers want to manage their outdated car seats responsibly and will recycle or reuse them when given the chance. Most parents do not want to throw out an item that they have spent significant money purchasing.

However, car seats, which are designed to withstand the impact of a car crash, are difficult to recycle. To strip and dismantle a car seat down to its component parts - largely rigid plastic, hard foam, and metal - requires significant labor. Straps and covers must be removed, screws and bolts loosened, and even rivets drilled out. The price of labor and other recycling costs will likely outweigh the value of recoverable materials, which means that the cost of recycling must be covered in some other way. In the programs that already exist in the United States and Canada,

consumers, hospitals, auto collision shops, or – in one case – a manufacturer help defray the cost of recycling. Additionally, product redesigns could make seats easier to disassemble without compromising child safety.

A car seat reuse and recycling program in King County is needed to ensure that unsafe seats are removed from use, access to safe secondhand seats is increased, and seats that have reached the end of usability enter the recycling stream. A successful program will require the involvement of multiple entities: car seat users who will donate or recycle their unused car seats; hospitals, doctors, first responders, car seat safety technicians, and recycling hotline workers who will educate car seat users about safe reuse and recycling options; nonprofits that will implement reuse programs; recyclers that will accept and process the materials; and manufacturers that will design greener products and take cradle-to-cradle responsibility for the car seats they make.

An Introduction to Car Seats

In the United States, automotive collisions are the leading cause of accidental death among children older than three years (5). In 2012, motor vehicle accidents took the lives of more than 1,100 children under the age of 14, with 176,000 additional children suffering collision-related injuries (6). Child passenger safety measures, such as utilizing proper car seats for children of all ages, reduce the number of deaths and injuries sustained by children in vehicular collisions. An estimated 10, 157 lives have been saved through correct car seat usage since 2004 (7).

What are Car Seats?

Car seats, also known as child restraint devices, are used to secure children into motor vehicles to keep them safe in the event of a collision. Washington State requires that children be

secured into a child restraint device every time they are in a motor vehicle from birth through the age of eight or until they reach 4'9" in height (8). Many child passenger safety technicians recommend that children remain in booster seats for much longer, as children may be up to 13 years old before the seat belts in a vehicle fit properly (9).

Because children's height, weight and proportions change significantly over the first 13 years of their lives, multiple car seats are usually required in order to secure them safely through each stage of their development. Each car seat covers a different age range and need (forward-facing or rear-facing for example) and different seats may be required in order to properly secure a child into different types of vehicles. Consumer Reports identifies five different types of car seats that may be used to secure children from birth through age thirteen (10). *See Appendix II for photographs of the different types of children's car seats.*

Rear-facing only seats are designed for infants and small toddlers, with height and weight limits set by the manufacturer. Most car seats of this style have a detachable base, which always remains in the vehicle. The child restraint shell, which has a handle, can be separated from the base allowing the child to be carried while secured in the seat.

Convertible car seats can be used in both the rear-facing and forward-facing positions, allowing them to adapt to the growing child. These seats can be used from infancy until the child reaches approximately 65 pounds, with height and weight limits determined by the manufacturer. These seats usually do not have a detachable base.

All-in-one car seats are similar to convertible car seats in that they can be used in the rear and forward facing positions. However, these seats can also be converted into belt-

positioning booster seats for the older child. Generally, these seats are bulkier than convertible seats as they are designed to be used until children reach 100 pounds or more. For some children, these seats are able to be used from infancy through age 12.

Combination seats can only be used in the forward-facing position. They are designed for children who meet the height, weight and age recommendations for forward-facing travel, which is usually at least age 2 and no longer able to fit correctly in a rear-facing safety seat. These seats offer a 5-point harness that properly secures young children. Combination seats can be converted to belt-positioning booster seats once the child reaches height and weight appropriateness.

Belt-positioning booster seats are designed for children who are old enough to understand the importance of not unlatching their safety belts and who are at least 40 pounds in weight. These seats make use of the vehicle safety belts, which they direct to the proper position for a child's proportions. Children should remain in belt-positioning booster seats until they are tall enough for the vehicle's safety belt to be used alone, which usually happens around 10-12 years of age when the child reaches 4'9" in height.

The dozens of companies that manufacture car seats may offer multiple models of each type of seat at varied price points. Many manufacturers offer several different lines, designed to offer enticing features to new parents, including the ability to snap into a stroller, a slim design so that a vehicle can accommodate several seats, trendy colors, futuristic sleek lines, side impact protection, and more. For example, the popular brand Britax currently manufactures three different models of rear-facing-only car seats, seven different models of convertible car seats, three combination seats, and two belt-positioning boosters, for a total of 15 different seats

currently in production (11). Such variety in seat design impacts the ease of dismantling the seats once they have reached their end of life, as each type of seat is constructed in a different manner, and design differences vary widely from manufacturer to manufacturer.

What are the Materials in Car Seats?

See Appendix III – Parts of a Combination Car Seat and Appendix IV - Components by Weight.

Car seats are comprised of a mix of recyclable and non-recyclable materials. Car seats typically weigh between 10-15 pounds, with an estimated 85% of the weight being rigid plastic, 5% metal and 10% cloth, strapping and soft foam (12). However, these percentages can vary significantly depending on the seats. Please see Appendix IV – Components by Weight.

Car seats contain the following components and materials:

Harness and straps – These secure the child to the car seat or the car seat to the vehicle. The harness and straps are frequently made of polyester webbing and are not widely recyclable. People who make bags or belts from reclaimed materials can sometimes reuse these.

Covers – Generally a nylon/polyester blend that is treated with flame retardant chemicals. May also contain: plastic or metal snaps, hooks and eyes, elastic, rigid plastic tabs, or Velcro. Some models also have a place to store metal seat belt locking clips that are needed in some vehicles. Car seat covers are not recyclable at this time, and because of the flame retardants, not good candidates for creative reuse.

Sun shades –Rear-facing-only seats often have a cloth and plastic sun shade. If separated from the fabric, which would be trash, the plastic ribs may be recyclable.

Comfort foam – A layer of soft foam beneath the cover to cushion the child, the comfort foam generally is treated with flame retardants, and is not widely recyclable.

Buckles – Securing the harness straps around the child, the buckles contain both plastic and metal. These can be repurposed or ground to separate the metal from the plastic. The reclaimed metal, and possibly the plastic, is recyclable.

Chest clip – The chest clip buckles at arm pit level on the child to help keep the harness snug. The chest clip is plastic, often made of acrylonitrile butadiene styrene ABS (#7) (13).

The **car seat shell** is the structural layer beneath the covers and soft foam. It is comprised of three materials which are fastened together: hard foam, rigid plastic and metal.

Hard foam (Styrofoam/polystyrene/EPS #6, EPE, EPP) – A layer of hard foam lines most seats. According to the American Chemistry Council, Expanded Polystyrene (EPS) is the most common variety used in car seats (14). Expanded Polypropylene (EPP) and Expandable Polyethylene (EPE) are also used (15). Clean, hard foam can be recycled at some processing facilities.

Plastic (various resin types) – The most common plastic in car seats is Impact Copolymer Propylene (ICP, Polypropylene, #5) (16). Often a large portion of the shell is a single piece of polypropylene (17).

A number of the following plastic components may be affixed to car seat shells including, but not limited to: handles, skid strips, shoulder belt guides, knobs,

recline levers, cup holders, head rests, arm rests, detachable bases, level indictors and buttons. These components may be made of nylon, ABS, thermoplastic elastomers (TPE) or other plastic (18).

Those involved in car seat recycling have reported finding various plastic resin types in the shell or other components, including HDPE (#2), LDPE (#4), acrylonitrile butadiene styrene (ABS, #7), Acetel (POM or polyoxymethylene, #7), and polycarbonate (#7) (19).

Resin identification codes *(Appendix V)* are not always included on each plastic part. More research is needed to clarify the types and amounts of plastic resins in car seats.

Metal (Steel, aluminum) –Each seat contains a variety of metal reinforcement plates as well as screws, bolts and/or rivets. Some seats also contain steel reinforcement bars that are embedded in the shell, and/or aluminum side walls (20). Although the bulk of the seat is plastic, typically the most valuable recyclable material is the metal.

Emerging materials – As car seat technology changes, new materials are being introduced. Several inflatable booster seats, like the BubbleBum, are already on the market, and Volvo is in the process of designing inflatable car seats with materials currently employed in building aircraft (21). Dorel is using a new foam technology derived from race car technology in some of their Safety 1st brand products (22). The Summer Infant Prodigy Infant Car Seat has introduced electronic equipment into their seat design (23). Recyclers should expect that the technology and materials used in car seats will shift over time.

Car Seats Expire

Car seats are one of the few consumer products whose purchase and correct use is mandated by law. Every state has its own laws governing car seat use. However, they all require that young children be properly secured into a child restraint system. Thus, parents and caregivers are legally obligated to purchase a product for which there are very limited end-of-life recycling alternatives. Compounding this problem is the fact that car seats come with an expiration date, and must be replaced when the expiration date is reached. As a result, many families purchase duplicate seats in order to comply with state laws that govern child passenger safety.

For some years, the industry standard has been to set an expiration date that is six years from date of manufacture. Manufacturers typically display either the date of manufacture or the expiration date on a sticker on the car seat shell or stamped somewhere on the plastic of the car seat shell. If this information is missing, parents are instructed to consult the owner's manual for date of manufacture or reference information about their car seat online.

Car seat expiration dates were developed by manufacturers in part through the testing of materials, which is performed to ensure that the materials can withstand repeated stresses such as sudden stops, a child's movements, and the temperature extremes within a closed car (24). Additionally, changes to car designs, as with the **LATCH** safety system for securing car seats, and changes to safety testing standards can make older seats harder to use or no longer considered safe. For instance, the National Highway Traffic Safety Administration (NHTSA) released a proposal in 2014 that would require that car seats designed for use up to 40 lbs. undergo side-impact safety testing, testing which is currently voluntary (25). As older seats "age out" via their

expiration dates, car seats that can better protect children in a side impact collision would become the new standard.

Car seat expiration dates directly impact rates of reuse and disposal. When parents must replace expired seats, those car seats cannot be shared between sibling and thus find their way into the waste stream. Families are required to dispose of them in favor of purchasing new seats. Secondhand stores and family-oriented nonprofit organizations are discouraged from distributing expired seats, as that violates the manufacturer's instructions.

However, with the advent of newer materials and design changes, some car seat manufacturers have extended their expiration dates, which will positively affect the length of the life of the car seat and the ability to reuse car seats thus lowering the numbers that are disposed. It also will enable car seat manufacturers to design seats that are truly "all-in-one" and usable for a child's entire youth. As of 2014, manufacturers have begun to adjust car seat expiration dates range from an average of six years to as many as 10 years (26). Car seats that are built into a car are designed to last the lifetime of the vehicle and do not expire, except in event of a vehicular collision. Extending expiration dates, as long as it is done safely, will have a positive impact on reducing the number of car seats that need to be recycled or get tossed in a landfill or incinerator when recycling options are nonexistent.

Safe Reuse of Car Seats

When attempting to divert items from disposal, a key part of the solution is to promote reuse when possible. With car seats, reuse is a controversial topic because of safety concerns. As with bicycle helmets, automobile collisions can compromise the integrity of car seats, even when

there is no visible damage to the seat. With second-hand seats, it is not always possible to verify that the seat has not been in a collision. Car seat safety can also be compromised by washing the harness with bleach or other chemicals, something which is also difficult to assess through visual inspection. Such seats should not be reused.

However, there are a great many people reusing car seats already. For example, parents commonly reuse seats that were previously used by older siblings or other family members. Parents may also buy used car seats at garage sales, secondhand stores or on Craigslist, even though this practice is discouraged by child passenger safety technicians because of the risk that the seat was previously in a collision, the seat is missing parts, including instructions, or has an outstanding recall. For families with limited incomes, used car seats may be the only ones available to them. Car seats are expensive items, and even getting them at cost can be pricy. Child passenger safety technicians describe moms using car seats from the early 1990s because they cannot afford newer, safer seats (27).

Reviews of data gathered from automobile collisions show clearly that the single biggest safety improvement that can be made for children is to ensure that they are seated and belted in a vehicle (28). Environmental considerations point to the additional benefits of reusing car seats. With these two considerations aligned, developing a network for safe reuse of car seats should be a priority.

Currently, a handful of social service agencies have developed safe car seat reuse networks. These programs have different protocols but usually include these safety measures:

- checking expiration date and recalls;
- verifying history of seat, if possible, and removing ones that have been in an automotive collision;

- doing a visual check of the seat looking for cracks, chips, or stress lines in the shell; warping, rust or broken rivets in the frame; cuts, frayed edges, broken stitches, or twisting in the harness or tether straps; tears in the padding; or broken buckles;
- matching each seat with the appropriate instruction manual;
- locating the manufacturer's certification sticker that contains the date of manufacturer of the seat, and identifying the seat model number to enable tracking of possible recalls.

Some programs have a car seat technician who does a thorough inspection of each seat. Each inspection takes approximately 20 minutes.

Consignment and second-hand stores vary in whether or not they accept used car seats for resale. Some consignment stores are risk averse and avoid the potential liability issues of seats with unknown collision histories. Others check recalls and expiration dates and allow parents to decide where their priorities lie on the safety/reuse/affordability scale. A simple form could help consignment stores better screen seats for safety. *See Appendix VI for an example of a form developed by SafetyBeltSafe U.S.A. for use by consignment and secondhand stores.*

In Washington State, charitable nonprofit organizations that distribute children's items to families in need at no charge are covered by RCW 70.200.020, which states that donors and distributing organizations are not liable for civil damages or criminal penalties resulting from the nature, age, condition, or packaging of the donated children's items unless a donor or distributing organization acts with gross negligence or intentional misconduct (29). This law does not cover consignment stores that would be selling the used seats; thus few do.

Many child passenger safety technicians are very wary of any reuse option, stating they would never reuse seats. Others see the problem differently: they know there are reusable seats that can find good homes, and multitudes of families who cannot afford new seats. These

advocates believe there are ways to check a seat for safe reuse, which is a better alternative than no car seat at all. However, encouraging the widespread reuse of car seats will take more than just a convenient infrastructure that utilizes safety screening protocols. It also will require public education, likely backed by representatives from the public health and medical communities, to reassure parents and child passenger safety technicians that reuse can be safe.

Car Seat Recycling

Even with solid reuse programs and extended expiration dates, car seats will eventually need to be retired. Additionally, automotive collisions and some types of recalls can render new car seats unusable in an instant. However, only a few metropolitan areas are served by programs that facilitate car seat recycling. This is largely because car seats are **difficult-to-recycle items** which are not designed to be easily broken down into their component parts. However, design changes, changing recycling markets, increased demand for recycled plastic, sustainable financing, and other factors could make wider-spread car seat recycling a possibility.

Car seats are not typically designed with recycling in mind, resulting in significant barriers to cost-effective recycling. In order to obtain the highest quality of plastic for recycling, all of the components of the car seat – metal, plastic, hard foam, cloth and other – must be separated from one another. While mixed plastics resins are sometimes permissible, many times different resin types must also be separated from one another.

With few exceptions, such as the Diono's steel-reinforced seats, the primary material contained in car seats is plastic, which typically makes up about 85% of the seat by weight (30). Plastic is a low-value recyclable. According to Bill Flinchbaugh of the Colorado Children's Automobile Safety Foundation, the approximate value of plastic in an individual 15 pound car seat

is between $1.00 and 1.50 in the recycling market (31). The difficulty in recycling the plastic parts of car seats is further complicated by manufacturers often neglecting to stamp the **resin identification number** and/or specific type of plastic into each individual plastic piece.

As of January, 2015, recycling markets for the soft comfort foam, harness straps and cloth covers on car seats are not in place. All known car seat recycling programs send those soft materials to the landfill or incinerator *(see Appendix VIII- Table of Known Car Seat Recycling Programs by Type).* Many ask the car seat's owner to **strip** and dispose of those parts themselves, as it can be quite labor-intensive to remove them.

Once the non-recyclable soft parts of the car seat are stripped off from the shell, the car seat shell containing metal, plastic and hard foam must be processed for recycling. Currently, three methods are employed by recycling processors that handle car seats: manual dismantling, shredding/grinding/chipping and baling with bulky rigid plastics.

Dismantling: Manually dismantling car seat shells involves using hand tools to separate the metal and the plastic components from each other. Car seats, which are designed to withstand an impact, do not come apart easily, making the processes of separating the different components both time-consuming and expensive. Rivets must be drilled out, and often multiple types of screws are used, each requiring a different size or type of screwdriver head to remove. Those currently dismantling car seats report that an individual car seat requires 15-30 minutes of labor in order to reduce it to its component parts (32).

While costly, dismantling car seats into their component parts allows for metal and plastic to be marketed separately. After the seats are dismantled, the large pieces of plastic can be

baled together and marketed. Metal components can be repurposed or recycled. However, as the costs associated with the complete dismantling of car seats are greater than the value of the materials, the recycling program must be supported by volunteer labor or funded through outside means. *See Models of Financing.*

Grinding, chipping or shredding: In order to reduce the amount of labor required, some car seat recycling programs are working with recycling processors who use machinery to grind, shred or chip the car seat shell into small pieces. The dismantling requirements for different types of machines vary. Some still require that the metal be removed prior to shredding. Other machines shred the plastic and metal together, using magnets to recover the metal pieces.

As mixed-resin plastic chips cannot be remade into as many kinds of products as single-resin plastic chips, the recovered plastic loses value. However, many of the costs associated with fully dismantling the seats are avoided. The car seat typically must be stripped of the cover, straps and soft foam prior to grinding. Often, the hard foam must also be removed prior to processing and either discarded or recycled separately.

Baling: Some recyclers are finding markets for non-dismantled seats, typically by baling the car seat shells, including the metal pieces, with **mixed bulky rigid plastics.** Recyclers using this method are often affiliated with **Materials Recovery Facilities (MRFs)** that are collecting non-food grade bulky rigid plastic, like buckets and laundry baskets. As long as the overall volume by weight of the bale is less than 2% metal (33) end markets have been willing to accept them. This type of recycling needs further investigation, including information about what is happening to the seats downstream in the recycling process, but

it is a promising avenue for keeping costs down and increasing rates of car seat recycling. The soft materials, such as the straps, soft foam and covers, still must be removed. The hard foam may also need to be removed and be discarded or recycled separately.

See *Appendix VII* for a table of programs by recycling process.

Special Considerations in Recycling Car Seats – Cradle-to-Cradle Design

A key piece of the solution for recycling car seats is designing them with a "**cradle-to-cradle**" mentality. This means that manufacturers design products with the products' entire lifecycle, including end-of-life, in mind. If recycling and reuse are part of the goals, the products are created in such a way that they are more durable for safe, longer use and reuse, contain the least possible toxic materials, and are more easily recycled. For example, using a single type of plastic resin in the shell of a car seat could allow the seats to be sorted by resin type and effectively run through a grinder to separate the metal and plastic. Car seats pose a particular challenge for cradle-to-cradle design in that they must both withstand impact in the event of a vehicular collision and be easily disassembled once they have expired.

Manufacturer Responsibility laws may be necessary in order for manufacturers to be incentivized to consider the end-of-life of their products. Such laws are common in the European Union, Canada and Japan. In 2014 in the United States, 33 states have 84 manufacturer responsibility laws across 12 product categories (34).

In response to the European Union's manufacturer responsibility laws for electronics and vehicles, designers have begun to make changes to their products in anticipation of disassembly and recycling needs (35). Because automobiles have similar safety concerns and safety test

requirements as car seats, the fact that these changes are beginning within that industry suggests that similar design adjustments could reasonably be made for car seats. Additionally, one car seat manufacturer, Clek, already designs its seats so that they are more easily dismantled. Clek offers a guarantee of recycling for any consumers who mail their used Clek car seats back to the manufacturer. See *Learning from Existing Car Seat Recycling Programs (below)* for additional information.

Special Considerations in Recycling Car Seats – Toxic Substances

All materials that are exposed to air in the passenger compartment of motor vehicles must comply with the burn resistance standards as regulated under the Federal Motor Vehicle Safety Standards Part 571, Standard No. 302: Flammability of Interior Materials (36). Several different types of flame retardants are available for commercial use, including chlorinated and brominated flame retardants which are either known or suspected to be toxic to humans based on peer-reviewed research.

Because of concerns about the health impact of long-term exposure to toxic flame retardants, work is being done by the Washington Toxics Coalition and other groups to require manufacturers to eliminate or reduce the amount of these chemicals used in children's products (37). Car seat manufacturers like Orbit Baby, Clek, Graco, and Britax have released statements indicating that they will phase out the use of brominated and chlorinated flame retardants (38). However, toxic flame retardants are still part of the equation and should be considered when recycling car seats as long term exposure could harm those collecting and processing the seats.

According to Erika Schreder, Science Director at the Washington Toxics Coalition, the bulk of the flame retardants in car seats are used on the covers and soft foam – the materials likeliest to ignite in event of a collision (39). Even with washing and years of use, the flame retardants will be present in the car seat. Because these soft materials break down more quickly than the hard plastic, they are likely to create a dust that contains flame retardants, which could be inhaled by the people handling them for recycling – consumers, volunteers, and paid staff. Occupational and environmental health nurse Karen Bowman recommends that whomever is handling car seats for recycling should protect themselves by working in a well-ventilated area, be properly trained, and wear appropriate personal protective equipment (PPE). It is also critical to train staff to wash their hands between glove changes and when they eat, smoke or put on lip balm, which presents an increased risk for exposure through ingestion (40). Additional control measures for toxic dust can be found in *Appendix VII.*

Healthy Stuff has tested car seats and found that car seats may contain other toxic materials, such as lead, chlorine (which indicates the presence of PVC), and other carcinogens or heavy metal allergens (41).

Learning from Existing Recycling Programs: Models for Car Seat Collection

Although not yet mainstream, car seat recycling programs do exist in some parts of North America. A review of existing programs demonstrates a range of collection and financing models, each offering its own sets of pros and cons. Each category below takes into account replicability, ease of use by consumers, and program sustainability. See *Appendix IX* for a table of programs by collection type.

Ongoing collection at a drop site: In this approach, a site decides to host a bin, drop box or simply to collect car seats in an available space. Some nonprofit organizations or businesses offer to collect car seats because it fits with their mission or business model. The Legacy Health Hospital System in Portland, Oregon, offers car seat recycling as a way to encourage child safety. Offutt Collision in Nebraska began by collecting car seats that had been in collisions while they then repaired the damage to the car. Safe Kids Salt Lake City (Utah) offers a series of recycling sheds into which anyone can drop an old car seat. In some cases, a single person concerned about car seat safety organizes a collection site, stripping and/or dismantling all of the seats single-handedly.

The drop-off collection model offers several benefits. It is available year round. It drives foot traffic to businesses that act as collection sites and helps them connect with customers who care about the environment and/or child safety. It can be offered free-of-charge to the customer, with the cost being borne by the business or nonprofit, or fees/donations can be collected to offset the cost of the program. Some collectors, such as hospitals and collision repair centers, may have the space, equipment and experience needed to store and strip or dismantle the seats. If a network can be established, drop-off locations can be conveniently located throughout a geographic area, increasing convenience for residents and facilitating coordinated transportation or "milk runs" to processors.

However, car seats are bulky and take up considerable storage space, which can be a challenge for some businesses and nonprofits, especially if they are offering recycling on an ad hoc basis. Untended drop sites, such as bins and sheds, can attract garbage; moreover, the seats may be picked up by families who do not have the ability to assess the seats for

suitability for reuse. Additionally, the seats typically must be collected and hauled to another location for processing and recycling.

A large organization, like a hospital, may be able to absorb the labor or cost required to collect car seats from various drop-off locations, as well as preparing the seats for recycling and paying the recycler, because it has the budget, staff power, and motivation to do so. However, there is no guarantee that financing from such organizations will be ongoing or sustainable for the longer term. Small businesses, small nonprofits and untended drop-off bins are more limited by the size of their physical space, their ability to either provide labor or charge a fee to cover costs, and the balance between offering car seat recycling as a community service and successfully running a business or program. Unless a network is developed, there is often a clear upper limit as to how many car seats smaller businesses and nonprofits can collect before collection becomes a burden, particularly if there is insufficient onsite staff and equipment to strip them.

"Depot" style recycling facilities: Several programs offer "depot" style recycling, in which a recycling business or nonprofit offers "one-stop shopping" for recycling. Customers can bring any number of items that are not typically collected at the curb – for example electronics, compact fluorescent lights, car seats – and drop them off at the one location. This model offers the benefit of the car seats coming directly to the recycler, where they can be dismantled or otherwise processed and baled. The facility already has machinery, space, and labor so infrastructure is not a problem. Customers appreciate a year round option that offers one-stop shopping for recycling.

The depot model has a few barriers. If customers do not live close to a depot, it may require that they drive a considerable distance in order to recycle. Additionally, many

depots charge a fee to the customer to cover the costs of labor to process the seat for recycling. This cost can be a deterrent to customers.

Ongoing collection curbside: In this model, consumers strip off any non-recyclable materials, such as the straps and covers, from their car seats and place them in or next to their recycling container to be collected curbside. This model encourages recycling by making it extremely convenient for the consumer. It can bundle costs into overall waste management fees, which makes recycling car seats seem "free" to many consumers.

The challenges of this type of program include: negotiating collection contracts with collection companies for picking up additional bulky items, finding space on the recycling truck, educating consumers to strip the non-recyclable materials, and keeping costs down. Additionally, if customers fail to remove the straps and covers before placing the car seats at the curb, the seats could be picked up and reused by other families without evaluating them for safety.

This type of program, once established, can be very effective in keeping car seats from the landfill as it is very accessible to customers.

Event-based collection: In this model, someone such as a recycler, municipality, nonprofit or child passenger safety technician organizes a one-day recycling event for car seats. The most common model is an annual drive around Earth Day. Child passenger safety technicians and additional volunteers, e.g. members of the local Kiwanis Club, high school students seeking community service hours, emergency responders or church groups, provide the labor to strip or dismantle the seats.

As this model relies on volunteers, events are infrequent. However, this model is

easily replicable once volunteer networks and a relationship with a recycler are established. It can be offered free of cost to consumers or donations can be collected to offset any recycling fees. If the community knows that there will be an annual event and saves seats for it, it can be especially effective in collecting significant numbers. For example, Maricopa County, AZ, collected 700 seats at a single event in 2013 (42).

See Appendix XII - Holding a Car Seat Recycling Event

Mail-in collection: Several different types of mail-in programs exist. One car seat manufacturer, Clek, offers a mail-in recycling program in which consumers can mail their unwanted Clek seats back to the company. Although the consumer must pay a $40 shipping fee, Clek gives the consumer a $40 gift card for their website. A sustainable children's products company, Baby Earth, offers a mail-in recycling service for many children's products. Accessibility to recycling is the main benefit of this type of program. In places where car seat recycling programs are scarce, having the option to mail-in the seat is preferable to the alternative of sending it to the landfill or incinerator.

However, the cost of mailing a bulky item like a car seat is high, as is the hassle of boxing and shipping it. Many consumers are deterred by the effort and cost. The Clek program is financed by the manufacturer, and so the costs of recycling (although not the shipping) are covered. Mail-in programs likely require the participation of a company that finances the cost of recycling.

Although car seat recycling programs that involve shipping seats to a place with an established recycling program are not ideal because they require consumer time and money, they still provide the net benefits of diverting materials from the landfill or

incinerator. In the absence of other alternatives, these programs provide an important stopgap measure.

See *Appendix X* - *Table of Car Seat Recycling "Ownership" Models.*

Models for Financing a Car Seat Recycling Program

Because the costs of recycling will likely exceed the value of the materials in car seats, consideration must be given to creating a sustainable financial model that will cover the collection, transportation and recycling costs. Possibilities for financing a car seat recycling program include:

End-of-Life Fees (Consumer Pays). This is a simple system to set up, particularly if there is a recycler or organization willing to collect seats. The Canadian "Recycling Depot" model relies on consumer fees for car seats, as do several programs in the United States. This model reaches consumers who are motivated to recycle and who can afford the fee.

Curbside collection systems also typically utilize a consumer-pays method of financing. Customers would pay for car seat collection and recycling as part of their solid waste bill, either embedded in the total cost or as a separate line item.

However, asking the customer for an end-of-life fee has several disadvantages for sustainable, widespread use. The cost may be a barrier – economically or emotionally – to some consumers. Furthermore, the collection site has to be set up to take money and staffed adequately to process additional transactions. A low-cost, drop-off collection program, such as an unstaffed shed, would not be feasible in this scenario.

Manufacturer Responsibility/Extended Producer Responsibility (EPR)/Product Stewardship (Manufacturer Pays). The manufacturer responsibility model requires that manufacturers assume responsibility for their products from cradle-to-cradle, including at end-of-life. Thus, the manufacturers provide and pay for a program that takes back and responsibly recycles products whose useful life has ended. This is a private sector solution, and it allows manufacturers to use their knowledge of the products they make and existing business relationships to develop a cost-effective program. In Washington State, this model has been implemented for computers, monitors, televisions, portable DVDs players, e-readers and mercury-containing lights. These manufacturer responsibility programs primarily utilize convenient drop-off sites throughout Washington to collect the products for recycling free-of-charge.

As manufacturers can build the cost of recycling into the price of the product, this approach results in ongoing, sustainable financing for the recycling program. Additionally, consumers have an incentive to recycle the product because they have already paid for the service. Once manufacturers are responsible for paying for the costs of recycling difficult-to-recycle items, they have an incentive to begin designing products for easier recycling.

This producer responsibility model has the strongest possibility to be sustainable and have ongoing funding.

Government Funding Model (Government Pays). In this approach, local government would provide car seat collection options and pay for the seats to be recycled. This approach can be challenging for local governments that are cash-strapped and faced with an array of toxic or hard-to-recycle items.

Underwriting/Sponsorship Model (Retailers or Others Pay). Retailers, hospitals, non-profits and other businesses may choose to provide car seat recycling as a public service to their communities. Whether their goal is child safety or conserving resources, they champion the recycling program and underwrite the associated costs. Often such businesses or organizations will provide much of the labor required to strip or dismantle the seats. Portland's Legacy Health approached car seat recycling as a child safety issue, incorporating the program into its existing hospital-wide recycling efforts. Offutt Collision Repair in Nebraska uses its auto repair equipment and technicians to disassemble the car seats.

A concern about this model of financing is the lack of a dedicated source of income to sustain the programs. In some cases, an increase in foot traffic and positive visibility within the community results in an increase in revenue, which offsets the costs of the program. This model is the most likely to be sustainable when managed by a large business or organization that can absorb the costs.

Job training model: Several car seat recycling programs have partnered with organizations that offer job training in order to both provide populations in need with work skills, while reducing the costs of dismantling car seats. Although such partnerships take cultivation, once established they provide workers with meaningful employment while also tackling the challenge of difficult-to-recycle items. For example, RecycleForce in Indianapolis hires recently released felons, providing job and life skills to these former inmates in their recycling facility. Because they are a nonprofit, RecycleForce obtains grant money to help offset its labor costs. By offering a spectrum

of recycling, it also subsidizes the car seat program with profit gleaned through recycling higher-value items (43).

Spotlight on King County, Washington

Several King County, WA, non-profit organizations reuse safe car seats, offering families an avenue for donating their still-useable seats. The best known program was developed by WestSide Baby in Seattle, WA. WestSide Baby staff or trained volunteers collect information on a donated car seat's history to verify its potential for reuse. A certified child passenger safety technician then inspects each seat to determine its suitability for reuse. Seats that pass inspection are given to families in need. Other area organizations that accept car seats for reuse include Eastside Baby Corner, Mary's Place and FamilyWorks Food Bank and Resource Center.

Car seat recycling has been offered intermittently in King County for approximately the past eight years. Safe Kids South King County launched early efforts through a few community drives with the purpose of removing unsafe seats from circulation. That effort expanded to include a partnership between Safe Kids, WestSide Baby, IKEA and Legacy Health in Portland. Safe Kids and IKEA would hold car seat reuse and recycling drives benefitting the clients of WestSide Baby. Potentially reusable seats were taken to WestSide Baby for inspection while recyclable seats were collected at IKEA, stripped of their non-recyclable parts onsite by volunteers and transported to Legacy Health's established recycling program in Portland, OR.

Recognizing the need for ongoing recycling efforts outside of collection events, WestSide Baby began to utilize its volunteer pool to dismantle unusable seats for recycling. Donors who knew that their seats were no longer usable were asked to contribute $5 per seat to help finance

the recycling program. WestSide Baby volunteers dismantled the car seats, which were collected by local recycling processor Total Reclaim.

As word of WestSide Baby's recycling program grew, they became inundated with expired or otherwise unusable car seats. The demand for car seat recycling outpaced the volunteer pool's ability to keep up with the dismantling, which led WestSide Baby to make the difficult decision to discontinue its public car seat recycling program. WestSide Baby continues to accept seats for reuse and also recycles any seats that do not pass its internal safety inspection.

Total Reclaim is currently working with Recology CleanScapes to bale and market the seats that Recology CleanScapes is collecting at its Issaquah and Burien stores. Residents of Issaquah, Maple Valley, Carnation and Burien may bring car seats to the CleanScapes stores free of charge. If the non-recyclable covers, straps and soft foam have not been removed by the customer, they are removed at the stores before the seats are transported to Total Reclaim. Options for marketing the seats without the labor-intensive hand-dismantling to component parts are being researched by the staff at Total Reclaim.

Republic Services offers car seat recycling to residents of Bellevue, WA. Residents are asked to bring proof of address along with their car seat to Republic's customer service center.

Those who do not live in the cities of Bellevue, Issaquah, Maple Valley, Carnation or Burien currently have no dependable car seat recycling option. The Old Car Seat, New Life project offered a pilot car seat reuse and recycling drive in conjunction with Total Reclaim and WestSide Baby in September, 2014. One hundred sixty-one car seats were collected for recycling or reuse. In the few months since that drive, dozens of inquiries have been received, indicating that the demand for car seat recycling was not met by a single drive. Parents and other potential car seat recyclers indicate

that they would like ongoing recycling options and that they would be willing to drive relatively far distances in order to recycle their seats.

Conclusion

Despite the challenges presented by such difficult-to-recycle items, a number of programs throughout North America are offering car seat recycling. For these programs, the benefits to child safety and environmental health outweigh the recycling challenges. However, the number of seats currently being collected is a drop in the bucket compared with the numbers of seats that are still being disposed in landfills and incinerators. Recycling hundreds of seats from a one-day event or even a thousand seats annually collected at a drop-off site does not begin to address the need to responsibly manage the 10 million seats that are sold annually in this country.

In order for the recycling of car seats to become scalable to the size of the problem, car seat manufacturers must become part of the solution. Already, there is an encouraging trend towards extending the expiration dates of the seats so that parents can use the seats longer and thereby purchase (and subsequently throw away) fewer. Manufacturers should continue to support ongoing safety testing and monitoring of the seats they have already produced to determine if expiration dates can be extended further and on a wider range of seats.

Additionally, the product designers and those engaged in car seat recycling should be in conversation with each other to ensure that design changes will allow for greater recycling of car seats rather than impede recycling efforts. While safety must be the designers' first priority, they should likewise consider the impact that their design and materials choices have on the ability to disassemble the seat and recover its component parts. Given parents' interest in recycling car seats, designing with recycling in mind should create a positive response among consumers.

Additionally, manufacturers should label plastics whenever possible through the use of resin identification numbers (RIN).

Recycling processors and the programs that work with them should be encouraged to disassemble car seats into their component parts for highly effective separation and recovery of recyclable materials. However, given that dismantling the seats is quite labor intensive, alternatives to dismantling should continue to be explored. Shredding the seats or baling them with bulky rigid plastics is more sustainable from a labor perspective. Research should be performed to ensure that a high percentage of the recyclable materials are in fact recycled and that secondary processors and end markets accept and handle the materials appropriately.

Dedicated and sustainable funding is essential to the success of reuse and recycling efforts. Extended producer responsibility for car seats would provide sustainable funding, thus ensuring that recycling is available for the 10 million car seats sold annually in this country. While one-day collection events play an important role in providing consumers with an avenue for recycling or donating their car seats, offering ongoing collection of car seats is vital for gathering car seats that can be safely reused by families in need, removing unsafe seats from use, and ensuring that car seats do not end up in the waste stream. Existing car seat reuse and/or recycling programs demonstrate that successful programs include: a commitment to child safety and/or a healthy environmental future; partnerships with forward-thinking and responsible recyclers who adapt to changing markets and technologies; long-term secure funding to ensure sustainable programs; and a committed network within the community to provide program support.

With King County being strongly progressive in the areas of environmental sensibility and public health, with Washington State already leading the way in recycling, and with our neighboring cities, Portland, Oregon, and Vancouver, British Columbia, modeling successful car

seat recycling programs, the time is ripe for establishing a pathway to eliminate car seats from the waste stream and place them into the hands of families that need them or recyclers who will send them on their way to a new life.

Appendix I - Glossary

Cradle-to-Cradle Design: A product design approach, often a large component of manufacturer responsibility, in which the impact of the product throughout its entire lifecycle, including production, use and end-of-life, is considered during the design process. Design changes may be made to increase recyclability, reduce toxicity, increase the use of renewable energy, and increase efficiency so that the product is sustainable at every life stage.

Difficult-to-Recycle Items: Used in this paper to describe items that are not easily sorted and bundled into marketable bales. Difficult-to-recycle items may contain multiple materials that are bonded together, materials that are hazardous, or both.

Dismantling a car seat: Used in this paper to describe the process of separating the car seat shell into its component parts: metal, rigid plastic and hard foam. Manually dismantling most car seats is labor intensive and requires several different tools.

Grinding/Shredding/Chipping: The process by which large pieces of recyclable plastics are converted into smaller pieces, which are in turn sold to vendors who will use them for making new products. Some machinery allows contaminants and other materials to be removed following the grinding/chipping/shredding process. For example, magnets may be used to separate any metallic pieces from the plastic.

LATCH (Lower Anchors and Tethers for Children): An improvement to child safety seats that was mandated in 2002. The LATCH system requires that cars have anchors for mounting car seats, and that car seats have connectors that can attach to those anchors, as well as a top tether that helps stabilize the car seat and reduces head excursion and is used for seats that are attached with lower connectors OR safety belts.

Manufacturer Responsibility/ Extended Producer Responsibility (EPR)/Product Stewardship: An environmental policy approach for minimizing a product's environmental impact throughout all stages of its life cycle in which a manufacturer's responsibility for a product is extended to the post-consumer stage of the product's life cycle. Manufacturer responsibility policies shift responsibility upstream toward the manufacturer and away from municipalities. This approach provides an incentive to manufacturers to take into account environmental considerations when designing their products, driving design innovations that would reduce waste and make products that are more durable and more easily recyclable.

Materials Recovery Facility (MRF): The specialized plant that handles recyclable items, receiving them from waste collectors, separating the materials into marketable groups, and preparing grouped materials for shipping to manufacturers or other recycling businesses.

Mixed Bulky Rigid Plastics: Large, rigid plastic items of resin type 2 (HDPE) or 5 (PP). Bulky rigid plastics include buckets, laundry baskets, plant pots and some other large plastic items that hold their shape. Plastic film, plastic bags and foam are not included in this category.

Resin/Resin Identification Code: Used within the plastics and recycling industries to describe the type of polymer that is used within a particular plastic. For example, each of the numbered plastics (1-6) is a different resin type, with #7 being a category into which all other plastics (non 1-6) are lumped. **Single Resin Type** is the ideal end product of recycling, as it can be marketed the most effectively and has the

highest value as it is not contaminated by other types of polymers. Please see Appendix V for a chart of resin identification codes.

Stripping a Car Seat: Used in this paper to describe the removal of the soft parts of the car seat (cover, harness and comfort foam) from the car seat shell. Most recyclers require that consumers or collection points strip the car seats before they will be accepted for recycling.

Appendix II - Types of Car Seats

Rear-facing only

Convertible (rear- or forward-facing)

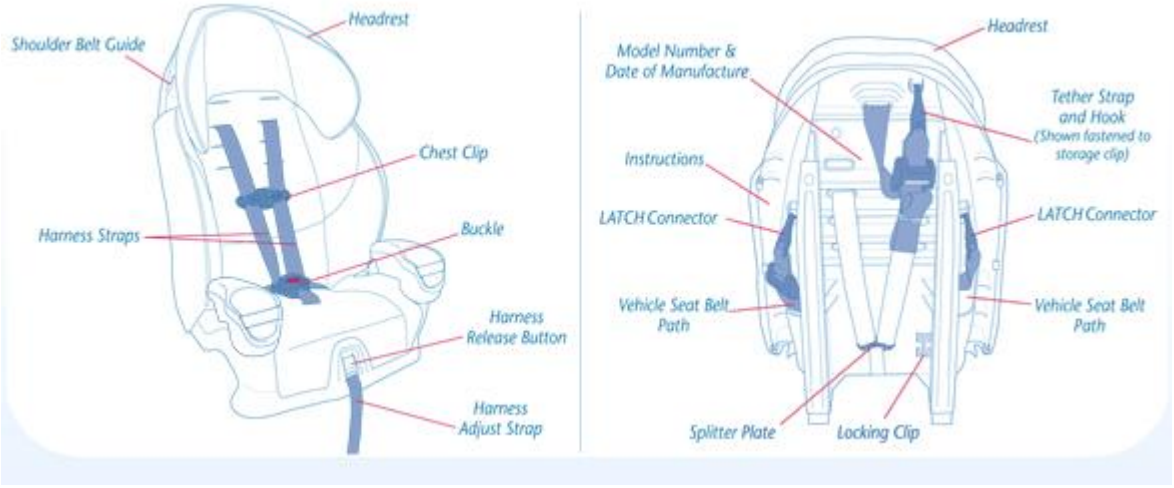
All-In-One (can be used rear-facing, forward-facing and as a booster)

Combination (forward-facing, can become a booster seat for older children)

Belt-positioning booster seats (can have a back or be backless)

Appendix III - Parts of a Combination Car Seat

Courtesy of Evenflo Company Inc.



Appendix IV – Components by Weight

The car seats evaluated in this section were donated to Old Car Seat, New Life for study purposes by parents who wanted to see them recycled. While we attempted to obtain a broad sample of seats, some brands, like Britax, were more plentiful in our area and therefore are over-represented in this data. Within these limits, we have attempted to offer a comparison of the range of seats, from infant through booster.

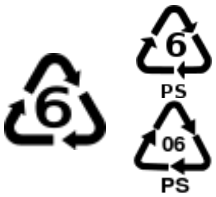
Under the "non-recyclable materials" category, we included covers, straps and soft comfort foam. We - and most of the recycling programs that we surveyed - have not identified recycling markets for these materials.

For more complete data, including the specific weights of the non-recyclable materials, please email KimberlyC@coolmom.org.

Seat	Seat type	Total weight of seat	Weight of plastic shell	Weight of small plastic parts	Total weight rigid plastic/ %weight rigid plastic	Weight hard foam/ % weight hard foam	Weight of metal/%weight metal	Weight of metal + plastic pieces/ % weight plastic + metal	Total weight nonrecyclable items/ % weight nonrecyclables	Notes
Graco Ultra CarGo Model 1753334 03/19/09	Combination (Harnessed booster)	10.4 4 lbs	5.4 lbs	1.1 3 lbs	6.53 lbs 63%	.13 lbs 1%	.73 lbs 7%	.41 lbs 4%	2.64 lbs 25%	
Britax Marathon Model E9L0626 6/17/09	Convertible	16 lbs	7.6 lbs	1.8 lbs	9.4 lbs 59%	.25 lbs 2%	2.7 lbs 17%	1.08 lbs 7%	2.46 lbs 15%	
Britax Decathlon Model E9W47D4 9/18/07	Convertible	14.9 2 lbs	7.6 lbs *	2.4 lbs	10 lbs 67%	.23 lbs 2%	.79 lbs 5%	1.14 lbs 8%	2.54 lbs 18%	*Plastic shell contains small amount of metal
Britax Roundabout Model E9L0227 11/06/08	Convertible	12.8 lbs	6.6 lbs	1.6 lbs	8.2 lbs 64%	.24 lbs 2%	1.09 lbs 9%	1.06 lbs 8%	2.05 lbs 16%	

Seat	Seat type	Total weight of seat	Weight of plastic shell	Weight of small plastic parts	Total weight rigid plastic/ %weight rigid plastic	Weight hard foam/ % weight hard foam	Weight of metal/%weight metal	Weight of metal + plastic pieces/ % weight plastic + metal	Total weight nonrecyclable items/ % weight nonrecyclables	Notes
Evenflo Triumph No sticker	Convertible	17.8 lbs	8 lbs	4.5 lbs	12.5 lbs 70%	.51 lbs 3%	2.17 lbs 12%	.46 lbs 3%	2.15 lbs 12%	Contains string in the plastic shell
Sunshine Radian Model US19500 11/09	Convertible	24.6 lbs	16.4 lbs*	.21 lbs	16.61 lbs <68%	.36 lbs 1% **	1.37 lbs 6%	3.03 lbs 12%	2.91 lbs 12%	*Plastic shell contains many large metal components. Of the 16.4 lbs, ~ 8 of that is metal bringing total metal to ~42% **foam contaminated with glue
Graco Snugride - Base Only Model 1750668 12/17/08	Infant seat - base only	5.35 lbs	3.9 lbs	.77 lbs	4.67 lbs 87%	n/a	.52 lbs 10%	n/a	.16 lbs 3%	
Graco Snugride complete seat + base Model 8F23SUS3 05/15/08	Infant seat + base	11.9 5 lbs	Seat* 3.8 lbs base 3.9 lbs	2.0 lbs	9.74 lbs 81%	.09 lbs 1%	.82 lbs 7%	.19 lbs 2%	1.11 lbs 9%	*Seat shell contains 2 metal buckles with rivets
Chicco KeyFit30 Model 060614726500 70 04/2008	Infant seat - seat only	9.09 lbs	Seat only* 4.2 lbs	2.4 lbs	6.57 lbs 72%	0.22 2%	.31 lbs 3%	.19 lbs 2%	1.8 lbs 20%	*plastic shell includes some metal riveted to it

Appendix V - Resin Identification Codes

	PETE or PET	Polyethylene terephthalate
	HDPE	High-density polyethylene
	PVC or V	Polyvinyl chloride
	LDPE	Low-density polyethylene
	PP	Polypropylene
	PS	Polystyrene
	OTHER or O	Other plastics, such as acrylic, nylon, polycarbonate, and polylactic acid (a bioplastic), and multilayer combinations of different plastics

Appendix VI – Safe Reuse Chart

Developed by Stephanie Tombrello of SafetyBeltSafe USA

Evaluation Form for Used Safety Seats (for Store Manager)

To the Donor of a Safety Seat:

Please help protect children by answering the following questions. Please print this form, write your answers, and attach it to the safety seat you are donating.

The History of the Donated Safety Seat:

Manufacturer _____

Model Name and Number _____

Manufacture Date _____

Was the seat purchased new by you? _____ A new gift? _____

Bought or received used? _____

Has there been a recall on the seat? ❑ Yes ❑ No ❑ Don't Know

If yes, did you repair the seat as the manufacturer instructed? ❑ Yes ❑ No

Was the seat involved in a crash? ❑ Yes ❑ No If yes, was a child in the seat? ❑ Yes ❑ No
Explain briefly _____

Is the original instruction booklet with the seat ? ❑ Yes ❑ No

To the Store Manager or Program Manager:

If you decide to sell or give the seat to a customer/client as described above by the donor, please confirm the information below and keep this form on file. If the seat is too old (beyond expiration date), has been in a crash, has visible damage, or you do not know its history, it must be destroyed or recycled. For additional information, contact SafetyBeltSafe U.S.A.

Instruction booklet is present ❑ Yes ❑ No

Recall list has been checked ❑ Yes ❑ No

If there was a recall, manufacturer has been contacted and repair made ❑ Yes ❑ No ❑ No recall

***SafetyBeltSafe* U.S.A.** P.O. Box 553, Altadena, CA 91003 www.carseat.org
310/222-6860, 800/745-SAFE (English) 310/222-6862, 800/747-SANO (Spanish)

#434SM (10-13-12)

Appendix VII – Control Measures for Toxic Dust
By Karen Bowman, MN, RN, COHN-S

Control measures for the type of toxic dust generated by car seats treated with flame retardants include:

- Engineering controls such as: HVAC systems or ventilation with a fan exhausting to the outside.
- Administrative controls such as: Training volunteers, personnel and staff on the hazards and ways to mitigate exposure by; hand washing, workplace hygiene, and precautions to reduce "take home exposures" from clothing and shoes by changing clothes and shoes before entering the home etc.
- Personal Protective Equipment such as: Respirators or dust masks, overalls or other barrier clothing, gloves etc. should be worn and left at the workplace.

It is important to note that organizations should follow the Washington State Department of Occupational Health and Safety (DOSH) and/or Occupational Safety and Health Administration (OSHA) guidelines for health and safety at the workplace.

If the organization decides to provide respirators for employees, they must comply with the "Voluntary Respiratory Protection Program" as outlined by the Department of Labor and Industries and/or OSHA.

Appendix VIII - Ways to Process Car Seats for Recycling

Before car seats can be recycled, the non-recyclable materials including the straps, covers and layer of comfort foam must be stripped from the seat. Following the stripping off of these materials, one or more of the following processing options may be performed by the recycler.

Manual dismantling: Separating the car seat shell into its components parts through drilling rivets out, removing many oddly sized and shaped screws, sawing out bolts and so forth.

Shredding, grinding or chipping: Machinery is used to grind, chip or shred the car seat shell into mixed resin plastic chips. Some machines are designed to handle multi-material recyclables and can therefore recover metal as well.

Baling with bulky rigid plastics: The entire car seat shell, including the metal pieces, is baled with the mixed bulky rigid plastics. As long as the overall weight of the bale is less than 2% metal, end markets may accept it.

	Program / Collector	Website	Partner Processor
Manual Dismantling	Salt Lake County Health Department (UT)	http://slcohealth.org/programs/injuryPrevention/safeKids/carSeatRecycling.html	Interwest Paper
	Offutt Collision (NE)	http://offuttcollisionrepair.com	Hands of the Heartland
Shredding, Chipping or Grinding	RecycleForce (IN) (mixed metal and plastic)	http://www.recycleforce.org	RecycleForce
	Salt Lake County Health Department (UT) (plastic and metal first separated through manual dismantling)	http://slcohealth.org/programs/injuryPrevention/safeKids/carSeatRecycling.html	Interwest Paper
Baling	Recycle Utah	www.Recycleutah.org	ProPolymer
	Eco-Cycle (CO)	www.ecocycle.org	Eco-Cycle
	Legacy Health (OR)	http://www.legacyhealth.org/our-legacy/legacy-values/sustainability/recycling.aspx	Envirofiber International

Appendix IX – Table of Known Collection Programs by Type

Program Type	Program Location	Name of Lead Organization
Curbside	City of Los Angeles, CA	Los Angeles Bureau of Sanitation
Curbside or Recycling Depot	Howard County, MD	Howard County
Drop Off (Collision Repair)	Sioux City, IA	Sioux Body Shop
Drop Off (Collision Repair)	Morristown, NJ	Shade Tree Garage
Drop Off (Collision Repair)	Omaha, NE	Offutt Collision
Drop Off (Collision Repair)	Hastings, NE	Levander Automotive
Drop Off (Collision Repair)	Lincoln, NE	Tracy's Collision Center
Drop Off (Collision Repair)	Norfolk, NE	Renner Auto Body
Drop Off (Collision Repair)	North Platte, NE	Keith's Body Shop
Drop Off (Collision Repair)	Grand Island, NE	Levander Automotive
Drop Off (Collision Repair)	Portland, OR	Fix Auto Portland
Drop Off (Collision Repair)	Portland, OR	Fix Auto Portland East
Drop Off (Collision Repair)	Portland, OR	Fix Auto Sunset
Drop Off (Collision Repair)	Gresham, OR	Fix Auto Gresham
Drop Off (Collision Repair)	The Dalles, OR	Fix Auto The Dalles
Drop Off (Collision Repair)	Beaverton, OR	Fix Auto Beaverton
Drop Off (Fire Station)	Murray, UT	Salt Lake County Health Department
Drop Off (Fire Station)	Herriman, UT	Salt Lake County Health Department
Drop Off (Hospital)	Salt Lake City, UT	Salt Lake County Health Department
Drop Off (Hospital)	Salem, OR	Salem Hospital
Drop Off (Hospital)	Portland, OR	Legacy Health Recycling Center
Drop Off (Hospital)	Little Rock, AR	Safe from the Start CPS Program
Drop Off (Hospital)	Portland, OR	Legacy Health
Drop Off (Hospital)	Spokane, WA	Sacred Heart Children's Hospital
Drop Off (Hospital)	Cleveland, OH	University Hospitals Rainbow Babies & Children's Hospital
Drop Off (Hospital)	Long Beach, CA	Miller Children's Hospital Long Beach Family Resource Center
Drop Off (Hospital)	Los Angeles, CA	Children's Hospital of Los Angeles
Drop Off (Police Station)	Gurnee, IL	Gurnee Police Department
Drop Off (Public Works Facility)	West Valley City, UT	Salt Lake County Health Department
Drop Off (Recycler)	Bellevue, WA	Republic Services
Drop Off (Retail)	Los Angeles, CA	The Children's Collective
Drop Off (Retail)	Long Beach, CA	Kidz Head 2 Toe Resale Boutique

Program Type	Program Location	Name of Lead Organization
Drop Off (Retail)	Long Beach, CA	Belmont Kidz
Drop Off (Retail)	Redondo Beach, CA	Kids Double Time
Drop Off (Retail)	Calgary, Canada	KidSeat Recyclers
Drop Off (Retail)	Austin, TX	Baby Earth
Drop Off (Retail)	Burien, WA	Recology CleanScapes Store
Drop Off (Retail)	Issaquah, WA	Recology CleanScapes Store
Drop Off (Retail)	Vancouver, WA	Cotton Babies
Drop Off (Roadside Shed)	Riverton, UT	Salt Lake County Health Department
Drop Off (Sheriff's Office)	Center Point, OR	Jackson County Sheriff's Office
Drop Off (Social Service Agency)	Canoga Park, CA	New Economics for Women
Drop Off (Social Service Agency)	San Pedro, CA	New Economics for Women
Drop Off (Transfer Station)	South Jordan, UT	Salt Lake County Health Department
Drop Off (Transfer Station)	Salt Lake City, UT	Salt Lake County Health Department
Mail-In	Canada and U.S.	Clek Inc
Mail-In	Austin, TX (available throughout the U.S.)	Baby Earth
Recycling Depot and Drop-off	Boulder, CO	Colorado Children's Automotive Safety Association
Recycling Depot	Ann Arbor, MI	Recycle Ann Arbor
Recycling Depot	Pomona, CA	TMC Horizon
Recycling Depot	Boulder, CO	Eco-Cycle/CHaRM
Recycling Depot	Salem, OR	Garten Services Recycling Center
Recycling Depot	Gibsons, BC	Gibsons Recycling
Recycling Depot	Indianapolis, IN	RecycleForce
Recycling Depot	McLeod Co, MN	McLeod County Solid Waste Management
Recycling Depot	Stearns County, MN	GreenSeats Car Seat Recycling Program
Recycling Depot	Vancouver, BC and Victoria, BC	PMD Recycling
Recycling Depot	Yolo County, CA	Yolo County Department of Health
Recycling Depot	Park City, UT	Recycle Utah
Recycling Event	Maricopa County, AZ	Safe Kids Coalition of Maricopa County
Recycling Event	Wisconsin	Safe Kids Coalition Wisconsin
Recycling Event	Bismarck, Grand Forks, and Fargo, North Dakota	North Dakota Department of Health

Appendix X – Table of Car Seat Recycling "Ownership" Models

Type	Descriptors/Pros & Cons	Examples
Hospital	Larger hospitals and medical centers: • Have the ability to scale up a program that other grassroots organizations do not. • Have tools and machinery, e.g. forklifts, on site by virtue of their size. • Already deal with large volumes of trash and recycling and have relationships with processors. Car seats can be an incremental addition for a processor who already enjoys a large contract. • Have many employees and car seat recycling could come under a variety of job duties, e.g. child passenger safety technicians, sustainability, waste management, child safety. • Often have space to store seats, however space on loading docks can be an issue. • Can begin a program like this, and it quickly becomes entrenched; patients know about it and spread the word. It becomes more difficult to discontinue. • Have child safety as a priority of their organization. Families look to hospitals to be leaders in child safety. • Want to be seen as healthy, sustainable organizations.	Legacy Health (OR) University of Arkansas Medical Sciences (UAMS) – Safe from the Start CPS (AR) University Hospitals Rainbow Babies and Children's Hospital (OH)
Automotive repair and collision shops	Automotive repair and collision shops: • Have tools and machinery as well as skilled employees to disassemble car seats quickly. • Already have contact with families whose seats cannot be used due to a collision. The need is immediate and on site when the car is brought in for repair. • May want to be a leader in sustainability. • Can offer families a great service that distinguishes their business.	Shade Tree Garage (NJ) Offutt Collision (NE) Fix Auto (various locations in Oregon) Sioux Body Shop (IA) Levander Automotive (NE) Tracy's Collision Repair Center (NE) Renner Auto Body (NE) Keith's Body Shop (NE)
County or State Public Health	County or state public health departments: • Can lead car seat recycling programs, currently often in more rural areas where other options might be less available.	Yolo County Health Department(CA)

Type	Descriptors/Pros & Cons	Examples
	• May have a champion within the department who begins the program. This can be a problem for longevity if others are not committed or knowledgeable. • Care about child safety and see this as a way to get unsafe seats out of circulation. • Are often running programs on a smaller scale, e.g. sometimes an annual drive. • Often have labor and space constraints. • Funding may not be sustainable.	North Dakota Department of Health
Child Passenger Safety Technicians	Child passenger safety technicians: • Care about child safety first and foremost and want to get unsafe seats out of circulation. • Can organize car seat recycling as a business model like KidSeat Calgary, where a technician saw the need and began her own business to meet it. • Can organize on a grassroots level by partnering with other local groups (Kiwanis, fire departments, car dealerships, etc.) to do occasional drives. This event-based model relies on volunteer labor and is not easily scalable. • Face space constraints.	KidSeat, Calgary (Canada) Safe Kids Wisconsin Safe Kids Coalition of Maricopa County (AZ)
Recycler	Recyclers: • Understand the business of recycling, know the markets, and can eliminate some points of confusion when other organizations are the collector. • Can gain additional business when a family drops off a seat and brings other recyclables or sees what else can be recycled. • Have machinery and labor for stripping seats, dismantling, and/or baling. • May have contacts with job training programs that can supply a labor force for the dismantling portion. For example, medium to high risk offenders who are trying to re-enter the work force or youth in a juvenile justice program.	RecycleForce, IN Eco-cycle/ CHaRM (CO)
City or County Government	Curbside collection: • Is a very convenient option for the car seat owner. • Utilizes existing infrastructure • Likely does not work for capturing seats for reuse. • Needs more investigation to understand potential challenges for collectors.	City of Los Angeles Bureau of Sanitation (CA) Howard County, MD

Type	Descriptors/Pros & Cons	Examples
	• Requires clear consumer education to strip off covers and straps, as well as a plan for handling seats that are improperly prepared.	
Manufacturers	Manufacturers: • May want to be a leader in child safety and sustainability. • Can provide sustainable financing as a cost of doing business, thus providing recycling that is free-of-charge when residents discard unwanted seats. • Can use their knowledge of the products they make and existing business relationships to develop a cost-effective program. • When providing the recycling program, have an incentive to design products that are easier to recycling. • Can be a selling point for families purchasing a seat. • If a mail back program, customers can be deterred by the hassle of boxing and shipping. However, manufacturers can set up alternate collection systems such as convenient networks of drop-off locations.	Clek (Canada & U.S.)
Retailer	Retailers: • May want to be a leader in child safety and sustainability. • Can offer families a great service that distinguishes their business. • If collecting in the store, may have space and labor challenges. • If a mail back program, customers can be deterred by the hassle of boxing and shipping. • Can successfully participate in a program led by another entity, for example hospitals or manufacturers. • Should weigh the environmental benefit of recycling the seat with the environmental costs of getting seats to the program.	Baby Earth (TX)

Appendix XI– Table of Known Recycling Programs by Location

Complete Table with Additional Information Available Online at:
www.recycleyourcarseat.org/recycling-locations

State/Province	Company or Non-Profit Name	Location
Arizona	Safe Kids Coalition of Maricopa County	Maricopa Co, AZ
Arkansas	Safe from the Start	Little Rock, AR
British Columbia	PMD Recycling	Vancouver, BC
	PMD Recycling	Victoria, BC
	Gibsons Recycling	Vancouver, BC
Calgary	Kidseat Recyclers/ Melrose Kids Inc	Alberta, Calgary
California	Los Angeles Bureau of Sanitation	Los Angeles, CA
	Yolo County Health Department	Yolo County, CA
	The Children's Collective	Los Angeles, CA
	Children's Hospital of LA	Los Angeles, CA
	Kidz Head 2 Toe Resale Boutique	Long Beach, CA
	Miller Children's Hospital Long Beach Family Resource Center	Long Beach, CA
	Belmont Kidz	Long Beach, CA
	TMC Horizon, Inc	Pomona, CA
	New Economics for Women	Canoga Park, CA
	New Economics for Women	San Pedro, CA
	Kids Double Time	Redondo Beach, CA
Colorado	Colorado Children's Automobile Safety Association-Foundation	Boulder, CO
	Eco-Cycle/CHaRM	Boulder, CO
Illinois	Gurnee Police Department	Gurnee, IL
Indiana	RecycleForce	Indianapolis, IN
Iowa	Sioux Body Shop	Sioux City, IA
Maryland	Howard County	Marriottsville, MD
Michigan	Recycle Ann Arbor	Ann Arbor, MI
Minnesota	McLeod County Solid Waste Management	McLeod County, MN
	GreenSeats Car Seat Recycling Program	Stearns County, MN
Nebraska	Offutt Collision Repair	Bellevue, NE
	Levander Automotive	Grand Island, NE
	Levander Automotive	Hastings, NE
	Tracy's Collision Center	Lincoln, NE
	Renner Auto Body	Norfolk, NE

State/Province	Company or Non-Profit Name	Location
	Keith's Body Shop	North Platte, NE
New Jersey	Shade Tree Garage	Morristown, NJ
North Dakota	North Dakota Department of Health	Bismarck, Grand Forks and Fargo, ND
Ohio	University Hospitals Rainbow Babies & Children's Hospital	Cleveland, OH
Ontario	Clek	Toronto, Canada
Oregon	Children's Hospital at Legacy Emmanuel	Portland, OR
	Legacy Health Recycling Center	Portland, OR
	Fix Auto Portland	Portland, OR
	Fix Auto Portland East	Portland, OR
	Fix Auto Sunset	Portland, OR
	Fix Auto Gresham	Gresham, OR
	Fix Auto The Dalles	The Dalles, OR
	Fix Auto Beaverton	Beaverton, OR
	Jackson County Sheriff's Office	Center Point, OR
	Garten Services Recycilng Center	Salem, OR
	Salem Hospital	Salem, OR
Texas	Baby Earth	Round Rock, TX
Utah	RecycleUtah	Park City, UT
	Salt Lake County Health Department	Salt Lake County, UT
Washington	Recology CleanScapes Store	Burien, WA
	Recology CleanScapes Store	Issaquah, WA
	Sacred Heart Children's Hospital	Spokane, WA
	Republic Services	Bellevue, WA
	Cotton Babies	Vancouver, WA
Wisconsin	Safe Kids WI	WI (statewide)

Appendix XII – Holding a Car Seat Recycling Event

Well-established car seat recycling programs sometimes began as grassroots efforts organizing a small, local drive and growing from there. If you are interested in holding a collection event for car seat recycling but don't know where to start, the ideas in this guide can help you have a successful and safe collection event! The *Old Car Seat, New Life* team in Seattle held a successful event in the fall of 2014 and would like to pass on lessons learned from that drive as well as previous events.

1. Begin with the obvious. Before you spend time organizing an event, **be sure you have a recycler who can take the car seats** and truly recycle them. Discuss which components the recycler wants and in what form. For example, recyclers are most likely to be interested in the large plastic shell and any metal embedded in it – which may or may not need to be separated from the plastic before it gets to the recycler. All of the other parts, e.g. covers, polystyrene, soft foam, straps, and small plastic bits, will need to have a destination as well. Some events have been able to repurpose and/or recycle some of these items, but some have had to go to the landfill.

   Consider entering into a contract or memorandum of understanding with the recycler to make all expectations, roles, staffing, and financial arrangements clear.

2. **Decide if you are offering reuse.** At several Seattle events, seats were accepted for reuse by a local nonprofit which needs seats for low-income families. The nonprofit accepts seats that have never been in an accident, never had their straps washed with harsh chemicals, and are less than 6 years old. If the seats arriving at the event passed that initial 3 question screen (volunteers checked the expiration date if the owner did not know), they were marked with a tag and put in a separate pile for reuse. A child passenger safety technician at the nonprofit did a more thorough safety check at their office. Separate storage and transportation was required for these seats since they were going to a different location.

3. **Determine what activities will happen at the event**. Will the seats be directly loaded into a truck with their straps and covers still attached or will they first be stripped down to the shell? Will you be distributing informational materials or surveying participants? Your space needs will vary depending on what will be happening at the event.

4. **Find a space.** Car seats are bulky items. Consider the number of families in your area and how many seats you might receive. At the event in Seattle, each participant brought in an average of 1.7 seats.

   Also think about traffic flow. How will people be arriving at your event? On foot, by transit, driving? How can you avoid congestion? Will cars be able to drive through? Is there adequate space to avoid cars forming a line into the street? The Seattle event used a bank's parking lot and had one of the volunteers stand in the drive through lane so cars could pull forward, talk to the volunteer, unload, and move on quickly which alleviated congestion.

If you are planning to strip the seats down to the plastic and metal shell at the event, you may need a larger space than you initially imagined. The Seattle event designated an area for stripping the seats in an adjacent but separate parking lot that was closed to traffic. Tarps were put down and volunteers were provided with all necessary tools. Adequate space was needed for bins or garbage bags for each component. Do not underestimate the size of a pile of car seat covers or a stack of odd sized polystyrene.

5. **Transportation.** You will need to set up a system for transporting the bulky seats to the recycler**.** Determine whether the recycler will provide a trailer/truck at the event. Work with the recycler to determine the size trailer that is needed based on the number of car seats you expect to receive. If you are using a pallet and gaylord system for placing the seats in the trailer, you can estimate space needs based on the dimensions of a gaylord (a 4'x4' heavy cardboard box), the number of seats that fit into each gaylord (about 15), and the size of the trailer. For example, a 28' trailer will fit about 12 gaylords or a total of about 180 seats. Once you determine the size truck or trailer needed to handle the seats you collect, ensure that there is adequate space and overhead clearance on the site for the trailer to park and maneuver. You'll want to coordinate with the provider of the truck/trailer to ensure that their space needs are met.

   If you are keeping reusable seats separate for delivery to a location other than the recycler, you'll need to also plan how you will transport those seats.

6. **Pick a date and think about partnerships.** Many people around the country plan car seat recycling events around Earth Day. Think about events in your area, for example sustainability fairs or car seat safety checks, that might be a logical pairing with car seat recycling. Some communities partner with car dealerships that can help provide volunteers for stripping the seats or dismantling. Account for volunteer availability when picking your date. At the event in Seattle, there were three or four volunteers per shift working with the public to accept the seats. There were separate groups of volunteers stripping the seats at the same time. You can't have enough volunteers for stripping the seats!

7. **Decide if you are charging a fee for recycling**. If you are charging a fee or asking for a donation, think about how you will handle the money. How will it be safeguarded – perhaps a cash box and/or one staff person who handles all money? What happens to the money at the end of the event?

8. **Think through and address safety concerns.** The top priority at any collection event is the safety of the staff, volunteers, and participants. Please consider the following suggestions to be starting points rather than all-inclusive safety precautions.

   Traffic/cars: When designing the event, you'll need to determine how traffic will move, including entering and exiting the event and where the line forms to drop off seats. Make sure that anyone working where there are cars can be easily seen by drivers. At the Seattle event, anyone who was directing or near traffic had on a yellow safety vest. This also identified them as someone with knowledge about the event. Signage, orange safety cones, and volunteers were used to direct cars.

   The area where volunteers are stripping seats should be separate from the areas where cars drop off the seats and from traffic. You might use cones and/or other dividers to block off the area where

volunteers are stripping seats.

Handling seats: Volunteers stripping the seats will need to be educated about how to safely do so, including safety precautions and proper tool use. After years of use, many seats are dirty when they arrive at a collection event. Most car seats also contain toxic flame retardants. It is therefore prudent to require anyone handling the seats to wear personal protective equipment including protective vinyl or nitrile gloves and to wash their hands at the end of their shift, or before eating, smoking or applying lip balm. At the Seattle event, safety information was sent to volunteers with their shift reminder, e.g. telling them they would be wearing gloves and that they should wash their hands after their shift. They should also bring a water bottle and wear closed toed shoes. Event organizers should provide the gloves, access to a hand washing station, and a first aid kit.

Because of the presence of flame retardants, seats should be stripped in a well-ventilated area. Since events are typically outdoors, this should not be an issue.

Loading seats: Car seats or the car seat shells will need to be loaded into a large trailer or truck for transportation to the recycler. Care will be needed when moving, lifting and loading the seats as well as entering the trailer. Some trailers require a step stool or ladder to enter. Renting a sturdy set of stairs with a railing is something to consider.

Containment: If there are open storm water drains where the seats are being dismantled, covering the drains will ensure that small pieces of polystyrene and other material will not go into the water system.

Insurance: Even with good planning and safety precautions in place, accidents can happen. Organizations running an event should ensure that there is a phone available in case of an emergency and should consider obtaining adequate insurance coverage for the event.

9. **Advertise your event.** Using blogs, list serves, press releases, and social media can be incredibly effective while also being low-cost. Consider using a short survey when families arrive to find out how they learned about the event to help advertise more effectively in the future.

10. **Decide what information to provide and collect**. An event can be a great opportunity to provide additional information to participants. However, extended conversations can slow down collection. At the Seattle event, we handed out a small information card with a link to a website for more information and also had promotional materials at a table.

    The Seattle team used a simple form for collecting basic information such as the number of participants, number of seats from each participant, the donation amount collected, and how the participant heard about the event.

11. **Orient your volunteers**. Provide information to volunteers ahead of time about what is expected at the event, what to bring, and basic safety precautions (see safety section above). At the event, provide sign-in sheets for volunteers and give them a short orientation depending on the task they are performing. Volunteers will either be working with the public taking their seats, directing traffic, or checking expiration dates on the seats. Volunteers will also be needed if seats are being stripped to the plastic shell.

For those volunteers stripping seats, additional orientation will be needed. Organizers should provide tools onsite – the most important are scissors, flathead and Phillips screwdrivers- or ask volunteers to bring their own tools. An allen wrench is also helpful. During orientation, staff can demonstrate the dismantling process and hand out an instruction sheet as well. Basic instructions include: remove the cover and put it in its bin; remove the soft foam and put it in its bin; cut straps so they are as long as possible. Then, remove straps and mixed plastic / metal components from the straps. Sort straps and plastic / metal bits into their bins. Separate metal clips and put them in a bin; pull out polystyrene blocks and put them in their bin; seat should be deconstructed down to its plastic shell and ready for the trailer.

12. **Miscellaneous event organization.** Think through a rain or hot weather plan. A canopy as well as a table and some chairs may be well appreciated.

13. **Clean up.** This can be a bigger task than anticipated, especially if you are stripping the seats at the event because of the bulk of all the materials. Think through how all of the types of materials will be transported from the event to locations for recycling or disposal. In addition, it will be helpful to have a Shop Vac to pick up all the little bits of detritus remaining from stripping the seats.

Materials list/Items you might need at the event:

Safety cones
Safety vests
Nitrile gloves
First aid kit
Hand washing station
Scissors
Screw drivers
Allen wrenches
Garbage bags / Bins / Boxes / Buckets
Tarps
Canopy
Tables
Chairs
Snacks for volunteers
Cups and water
Shop Vac
Cash box or money belt
Event signage
Promotional materials
Surveys on clipboards
Volunteer sign-in sheets
Camera
Pencils, pens
Step ladder and/or movable stairs with railing

Endnotes

1. "Child Safety Seat Fact Sheet." American Automobile Association (AAA). January, 2008. Web. 10 December 2014. <http://grist.files.wordpress.com/2011/10/cps_fact_sheet.pdf>.

2. Washington State Vital Statistics: 2012 Highlights. Washington State Department of Health. 2013. Web. 19 April 2014. < http://www.doh.wa.gov/Portals/1/Documents/Pubs/422-099-VitalStatisticsFactSheet2012.pdf>.

3. Schilz, Sarah. Personal Interview with K. Christensen. 21 October 2013.

4. "CoolMom, WestSide Baby and Waste Management Take on 300 Car Seats." CoolMom. October, 2010. Web. 29 May 2014. <http://www.coolmom.org/campaigns/copy_of_CarseatrecyclingeventOctober2010.pdf>.

5. Durbin, Dennis R., M.D. "Technical Report – Child Passenger Safety." *Pediatrics* Volume 127 (4), April 2011: e1050.

6. "Child Passenger Safety: Features." Centers for Disease Control. September 12, 2014. Web. 10 December 2014. <http://www.cdc.gov/features/passengersafety/index.html>.

7. Ibid.

8. Washington State Legislature RCW 46.61.687 1 June 2007. Web. 20 May 2014 <http://apps.leg.wa.gov/rcw/default.aspx?cite=46.61.687>.

9. "Who Should Use a Booster." The Car Seat Lady. Web. 10 December 2014. <http://thecarseatlady.com/who-should-use-a-booster/>.

10. "Car Seat Buying Guide." Consumer Reports. April 2014. Web. 4 May 2014. <http://www.consumerreports.org/cro/car-seats/buying-guide.htm>.

11. "Britax Car Seats." Britax. Unknown publication date. Web. 15 May 2014. <http://www.britaxusa.com/car-seats?hpbl=carseats>.

12. Clark, Bill. "Re: Car Seat Recycling." Email to B. Doyle. 9 January 2014. Also, Romo, May. "Emailing: CarSeatComponents." Email to B. Doyle. 10 December 2014. Also, Dahle, Eric. Dahle. "RE: E-Introduction of Brooke Graham Doyle." Email to K. Christensen. 30 December 2014.

13. Romo, May. "Emailing: CarSeatComponents." Email to B. Doyle. 10 December 2014.

14. “Plastic Child Safety Seats: Protecting Our Most Precious Cargo.” American Chemistry Council. Unknown publication date. Web. 15 May 2014. <http://plasticsinfo.org/Main-Menu/Baby-Care/Plastic-Child-Safety-Seats-Protecting-Our-Most-Precious-Cargo.html>.

15. Donaldson, Denise. “Re: Range of Plastics.” Email to B. Doyle. 14 October 2014.

16. “Plastic Child Safety Seats: Protecting Our Most Precious Cargo.” American Chemistry Council. Unknown publication date. Web. 15 May 2014. <http://plasticsinfo.org/Main-Menu/Baby-Care/Plastic-Child-Safety-Seats-Protecting-Our-Most-Precious-Cargo.html>. Also, Dahle, Eric, Director, Engineering & Program Management Evenflo Company. Email to D. Donaldson. 23 October 2014.

17. Romo, May. “Emailing: CarSeatComponents.” Email to B. Doyle. 10 December 2014.

18. Ibid.

19. Flinchbaugh, Bill. Telephone Interview with K. Christensen. 14 January 2014. Also, Donaldson, Denise. “Re: Range of Plastics.” Email to B. Doyle. 14 October 2014.

20. “Radian RXT.” Diono. 2014. Web. 4 December 2014. <http://us.diono.com/convertible-to-booster/radianrxt>

21. Davies, Alex. “Volvo Just Revolutionized the Car Seat in a Way That Parents Are Going to Love.” Business Insider. 14 April 2014. Web. May 31 2014. <http://www.businessinsider.com/volvo-inflatable-car-seat-safe-2014-4>.

22. Gordon, Sandra. “High Tech Child Car Seats: Innovation for Safer Rides.” Edmunds.com. 11 July 2013. Web. 15 May 2014. <http://www.edmunds.com/car-safety/high-tech-child-car-seats-innovation-for-safer-rides.html>.

23. “The Smartest Car Seat on the Market.” Juvenile Products Manufacturers Association. 20 July 2012. Web. 31 May 2014. < http://www.jpma.org/blogs/parenting/smartest-car-seat-market>.

24. Shapka, Jen. “Why Do Car Seats Expire? And How Long Is Mine Good For?” Vancouver Island Car Seat Technicians. 4 March 2013. Web. 13 December 2014. <http://vicarseattechs.com/2013/why-do-car-seats-expire/>.

25. “NHTSA Proposes First-Ever Side Impact Test for Child Restraint Systems.” National Highway Traffic Safety Administration. 22 January 2014. Web. 13 December 2014. <http://www.nhtsa.gov/About+NHTSA/Press+Releases/NHTSA+Proposes+First-Ever+Side+Impact+Test+for+Child+Restraint +Systems>.

26. Shapka, Jen. “Why Do Car Seats Expire? And How Long Is Mine Good For?” Vancouver Island Car Seat Technicians. 4 March 2013. Web. 13 December 2014. <http://vicarseattechs.com/2013/why-do-car-seats-expire/>.

27. Hess, Kerianne. “Question from our conversation.” Email to B. Doyle. 2 June 2014.

28. Doyle, Joseph J., Jr. and Steven D. Levitt. “Evaluating the Effectiveness of Child Safety Seats and Seat Belts in Protecting Children from Injury.” Economic Inquiry 48, 3 (July 2010): 521-36.

29. Washington State Legislature RCW 70.200.020 1997. Web. 31 May 2014. <http://apps.leg.wa.gov/rcw/default.aspx?cite=70.200.020>.

30. Dahle, Eric. “RE: E-Introduction of Brooke Graham Doyle.” Email to K. Christensen. 30 December 2014.

31. Flinchbaugh, Bill. Telephone Interview with K. Christensen. 14 January 2014.

32. Schilz, Sarah. “RE: Car seats, of course.” Email to K. Christensen. 3 March 2014.

33. “Model Bale Specifications: Bulky Rigids.” The Association of Postcomsumer Plastics Recyclers. Unknown publication date. Web. 9 July 2014. < http://www.nrra.net/wp-content/uploads/Rigid-Plastics-spec..pdf>.

34. Cassel, Scott. “EPR’s Next Step.” Resource Recycling December, 2014. <http://c.ymcdn.com/sites/productstewardship.site-ym.com/resource/resmgr/News_articles_featuring_PSI/2014_December_-_Resource_Rec.pdf>

35. Van Rossem, Chris, Naoko Tojo, and Thomas Lindhqvist. “EPR – An examination of its impact on innovation and greening products.” The International Institute for Industrial Environmental Economics September, 2006. Web. 20 May 2014. <http://www.greenpeace.org/international/PageFiles/24472/epr.pdf>.

36. “Federal Motor Vehicle Safety Standards and Regulations.” United States Department of Transportation, National Highway Traffic Safety Administration. December, 1998. Web. 13 December 2014. <http://www.nhtsa.gov/cars/rules/import/FMVSS/index.html#SN302>

37. “Toxic-Free Kids and Families Act.” Washington Toxics Coalition. Unknown publication date. Web. 31 May 2014. <http://watoxics.org/campaigns/Toxic%20Free%20Kids%20Act>.

38. Pena, Karla. “Testing Children’s Car Seats for Toxic Chemicals.” HealthyStuff.org 2014. Web. 20 January 2015. < www.indiegogo.com/projects/testing-children-s-car-seats-for-toxic-chemicals>

39. Schreder, Erika. “FWD: Car Seat Question.” Email to K. Christensen. 28 April 2014.

40. Bowman, Karen. “Edited copy of car seat recycling.” Email to K. Christensen. 31 January 2015.

41. “Hazardous Flame Retardants Found in Majority of 2011 Child Car Seats.” HealthyStuff.org. 3 August 2011. Web. 14 January 2015. <http://www.healthystuff.org/get-stuff.php?report=Hazardous+flame+retardants+found+in+majority+of+2011+child+car+seats#sthash.r9IAm9FJ.dpuf>

42. Tong, B. “Re: Car Seat Recycling Options.” Email to B. Doyle. 28 January 2014.

43. Stites, Ed. Phone conversation with B. Doyle. 3/6/2014.

Sources

Bowman, Karen, MN, RN, COHN-S, Karen Bowman & Associates, Inc. "Edited copy of car seat recycling." Email to K. Christensen. 31 January 2015.

Boyd, Buddy, Founder, Gibsons Recycling Depot. "RE: Questions about car seat recycling." Email to K. Christensen. 21 May 2014.

"Britax Car Seats." Britax. Unknown publication date. Web. 15 May 2014. <http://www.britaxusa.com/car-seats?hpbl=carseats>.

"Car Seat Buying Guide." Consumer Reports. April 2014. Web. 4 May 2014. <http://www.consumerreports.org/cro/car-seats/buying-guide.htm>.

"Child Passenger Safety Factsheet." Centers for Disease Control and Prevention (CDC). 6 May 2014. Web. 9 May 2014. < http://www.cdc.gov/motorvehiclesafety/child_passenger_safety/cps-factsheet.html>.

"Child Passenger Safety: Features." Centers for Disease Control. September 12, 2014. Web. 10 December 2014. <http://www.cdc.gov/features/passengersafety/index.html>.

"Child Passenger Safety Laws." Governors' Highway Safety Association (GHSA). May 2014. Web. 4 May 2014. < http://www.ghsa.org/html/stateinfo/laws/childsafety_laws.html>.

"Child Safety Factsheet." AAA. July 2008. Web. 19 April 2014. <http://grist.files.wordpress.com/2011/10/cps_fact_sheet.pdf>.

Clark, Bill, Environmental Manager at Legacy Health Portland. "Re: Car Seat Recycling." Email to B. Doyle. 9 January 2014

"CoolMom, WestSide Baby and Waste Management Take on 300 Car Seats." CoolMom. October, 2010. Web. 29 May 2014. <http://www.coolmom.org/campaigns/copy_of_CarseatrecyclingeventOctober2010.pdf>.

Dahle, Eric, Director, Engineering & Program Management Evenflo Company. "RE: E-Introduction of Brooke Graham Doyle." Email to K. Christensen. 30 December 2014.

Davies, Alex. "Volvo Just Revolutionized the Car Seat in a Way That Parents Are Going to Love." Business Insider. 14 April 2014. Web. May 31 2014. < http://www.businessinsider.com/volvo-inflatable-car-seat-safe-2014-4>.

Denison, Richard. "Environmental Life-Cycle Comparisons of Recycling, Landfilling and Incineration: A Review of Recent Studies." Annual Review of Energy and the Environment 21 (1996), 191–237.

Donaldson, Denise, Child Passenger Safety Technician, Safe Ride News. "Re: Range of Plastics." Email to B. Doyle. 14 October 2014.

Doyle, Joseph J., Jr. and Steven D. Levitt. "Evaluating the Effectiveness of Child Safety Seats and Seat Belts in Protecting Children from Injury." Economic Inquiry 48, 3 (July 2010): 521-36.

Durbin, Dennis R., M.D. "Technical Report – Child Passenger Safety." *Pediatrics* Volume 127 (4), April 2011: e1050.

"Federal Motor Vehicle Safety Standards and Regulations." United States Department of Transportation, National Highway Traffic Safety Administration. December, 1998. Web. 13 December 2014. <http://www.nhtsa.gov/cars/rules/import/FMVSS/index.html#SN302>

"First-Ever Ranking of Toxic Chemicals in Child Car Seats Released Today at HealthyCar.org." HealthyStuff.org. 16 May 2007. Web. 27 May 2014. <http://www.healthystuff.org/release.051607.carseats.php>.

Flinchbaugh, Bill, Director, Colorado Children's Automobile Safety. Telephone Interview. 14 January 2014.

"Gains Made in Recycling Rigid Plastics." Recycling Today. 18 March 2014. Web. 15 May 2014. <http://www.recyclingtoday.com/rigid-plastics-recycling-acc-2012.aspx>.

Garcia, Aida. "Chemical Conscious Parents UPDATE on Non-Toxic Car Seats." Non-Toxic Munchkin. 22 February 2014. Web. 13 December 2014. <http://www.nontoxicmunchkin.com/2014/02/chemical-conscious-parents-update-on.html>.

Gordon, Sandra. "High Tech Child Car Seats: Innovation for Safer Rides." Edmunds.com. 11 July 2013. Web. 15 May 2014. <http://www.edmunds.com/car-safety/high-tech-child-car-seats-innovation-for-safer-rides.html>

"Hazardous Flame Retardants Found in Majority of 2011 Child Car Seats." HealthyStuff.org. 3 August 2011. Web. 14 January 2015. <http://www.healthystuff.org/get-stuff.php?report=Hazardous+flame+retardants+found+in+majority+of+2011+child+car+seats#sthash.r9IAm9FJ.dpuf>

"Infant Car Seats." March of Dimes. July 2011. Web. 19 April 2014. <http://www.marchofdimes.com/baby/infant-car-seats.aspx>.

Lee, Michael, Project Manager, City of Los Angeles Bureau of Sanitation. Telephone Interview. 18 March 2014.

Lorch, Craig, Co-Owner, Total Reclaim. Personal Interview. 16 April 2014.

"Model Bale Specifications: Bulky Rigids." The Association of Postcomsumer Plastics Recyclers. Unknown publication date. Web. 9 July 2014. < http://www.nrra.net/wp-content/uploads/Rigid-Plastics-spec..pdf>.

"NHTSA Proposes First-Ever Side Impact Test for Child Restraint Systems." National Highway Traffic Safety Administration. 22 January 2014. Web. 13 December 2014. <http://www.nhtsa.gov/About+NHTSA/Press+Releases/NHTSA+Proposes+First-Ever+Side+Impact+Test+for+Child+Restraint +Systems>.

"Plastic Child Safety Seats: Protecting Our Most Precious Cargo." American Chemistry Council. Unknown publication date. Web. 15 May 2014. <http://plasticsinfo.org/Main-Menu/Baby-Care/Plastic-Child-Safety-Seats-Protecting-Our-Most-Precious-Cargo.html>

Romo, May, Injury Coordinator, Safe Kids. "Emailing: CarSeatComponents." Email to B. Doyle. 10 December 2014.

Schilz, Sarah, Director of Programs, WestSide Baby. "RE: Car seats, of course." Email to K. Christensen. 3 March 2014.

Schilz, Sarah, Director of Programs, WestSide Baby. Personal Interview. 21 October 2013.

Schirber, Michael. "The Chemistry of Life: the Plastic in Cars." Live Science. 26 May 2009. Web. 15 May 2014. < http://www.livescience.com/5449-chemistry-life-plastic-cars.html>

Schreder, Erika, Science Director, Washington Toxics Coalition. "FWD: Car Seat Question." Email to K. Christensen. 28 April 2014.

Shapka, Jen. "Why Do Car Seats Expire? And How Long Is Mine Good For?" Vancouver Island Car Seat Technicians. 4 March 2013. Web. 13 December 2014. <http://vicarseattechs.com/2013/why-do-car-seats-expire/>.

"The Smartest Car Seat on the Market." Juvenile Products Manufacturers Association. 20 July 2012. Web. 31 May 2014. < http://www.jpma.org/blogs/parenting/smartest-car-seat-market>.

Stewart, Teresa. "Why Do Car Seats Expire?" Isis: Parenting Starts Here. 2 April 2013. Web. 19 May 2014. < http://blog.isisparenting.com/why-do-car-seats-expire/>.

Stites, Ed, Director of Community Outreach, RecycleForce. Phone conversation with B. Doyle. 3/6/2014.

Tombrello, Stephanie, Executive Director, SafetyBeltSafe, U.S.A.. "Fw: [CPSPList] car seat recycling options." Email to B. Doyle. 28 January 2014.

Tong, Boyd, Director, Safe Kids Coalition of Maricopa County. "Re: Car Seat Recycling Options." Email to B. Doyle. 28 January 2014.

"Toxic-Free Kids and Families Act." Washington Toxics Coalition. Unknown publication date. Web. 31 May 2014. < http://watoxics.org/campaigns/Toxic%20Free%20Kids%20Act>.

"Used Car Seats: How to Borrow/Buy/Sell a Used Car Seat Safely." The Car Seat Lady. July, 2011. Web. 15 May 2014. < http://thecarseatlady.wordpress.com/tipsheets/used/>.

Van Rossem, Chris, Naoko Tojo, and Thomas Lindhqvist. "EPR – An examination of its impact on innovation and greening products." The International Institute for Industrial Environmental Economics September, 2006. Web. 20 May 2014. <http://www.greenpeace.org/international/PageFiles/24472/epr.pdf>.

Washington State Legislature RCW 46.61.687 1 June 2007. Web. 20 May 2014. <http://apps.leg.wa.gov/rcw/default.aspx?cite=46.61.687>.

Washington State Legislature RCW 70.200. 1997. Web. 31 May 2014. <http://apps.leg.wa.gov/rcw/default.aspx?cite=70.200.020>.

Washington State Vital Statistics: 2012 Highlights. Washington State Department of Health. 2013. Web. 19 April 2014. < http://www.doh.wa.gov/Portals/1/Documents/Pubs/422-099-VitalStatisticsFactSheet2012.pdf>.

"Who Should Use a Booster." The Car Seat Lady. Web. 10 December 2014. <http://thecarseatlady.com/who-should-use-a-booster/>.

"Why Do Car Seats Have Expiration Dates?" Safety Squad. 14 August 2007. Web. 31 May 2014. <http://safetysquad.typepad.com/safety_squad/2007/08/why-do-car-seat.html>.

Acknowledgements

The Old Car Seat, New Life team is grateful to the many child passenger safety technicians, recycling program coordinators, waste industry specialists and others with an amazing breadth of knowledge which they so willingly shared with us. Your dedication to children's safety and a healthy planet is amazing, and we are forever in your debt.

Special thanks to the following people who went out of their way to help us compile and revise the information contained in this paper:

Shirli Axelrod
Eric Dahle
Denise Donaldson
Bill Flinchbaugh
Scott Jenkins
Craig Lorch
May Romo
Stephanie Tombrello
Tom Watson
The Team at Legacy Emmanuel: Bill Clark, Tammy Franks, Tammy Dunn, Genevieve Johnson and Kendra Lathim
The Team at WestSide Baby: Sarah Schilz, Nancy Woodland, Jessica Ivey and Gary Chenkovich