Determination on the Recyclability of Food-Service Foam

Pursuant to Local Law 142 of 2013

Submitted to:
Mayor Bill de Blasio
Council Speaker Melissa Mark-Viverito
Antonio Reynoso, Chair, Council Committee on Sanitation and Solid Waste Management

By:
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A. EXECUTIVE SUMMARY

As described herein and summarized below and pursuant to Local Law 142 of 2013, the New York City Department of Sanitation ("DSNY" or "the Department") determines that Food-Service Foam or post-consumer Food-Service Foam **cannot be recycled** in a manner that is economically feasible or environmentally effective for New York City.

As a result of this determination, on and after November 13, 2017, no food service establishment, mobile food commissary, or store shall possess, sell, or offer for use single-service articles that consist of expanded polystyrene ("Food-Service Foam"), unless otherwise exempt under Local Law 142. In addition, no manufacturer or store shall sell or offer for sale polystyrene loose fill packaging ("Foam Packing Peanuts"). In accordance with Local Law 142, DSNY will provide public education and outreach to food service establishments, mobile food commissaries, and stores to inform them of the provisions of this section and provide assistance with identifying replacement material and no violations will be issued under this Law until May 14, 2018.

To make this determination, the Department has consulted with and requested information from the City's metal, glass, and plastic recycling contractor Sims Municipal Recycling ("Sims"); manufacturers and purported recyclers of expanded polystyrene; plastics industry and recycling market experts; other municipalities and their recycling contractors; and other stakeholders with expertise on expanded polystyrene, as required by Local Law 142.

Key Findings:

For 30 years, attempts to recycle Food-Service Foam—both subsidized and non-subsidized attempts—have failed at each step of the recycling process. The municipalities and programs that DSNY researched tell a very clear story: Food-Service Foam is not capable of being recycled in an environmentally effective or an economically feasible manner.

The municipalities found that Food-Service Foam compacts in collection trucks, breaks into bits, and becomes covered in food residue, making it worthless when it arrives at the material recovery facility ("MRF"). It then blows throughout the MRF, is missed by manual sorters, mistakenly moves with the paper material and contaminates other valuable recycling streams, namely paper, which can be the most consistently valuable commodity in a recycling program. Food-Service Foam is too costly to clean and process compared to virgin material. If some is sorted successfully, the light-weight foam must be stored for months, waiting for enough material to economically ship.

If any Food-Service Foam makes it over these hurdles, the process grinds to a stop due to the struggle to find a buyer. With no buyer, municipalities get stuck with the material and ultimately send the remaining amount of Food-Service Foam that was not already landfilled after the compacting or sorting phases to a landfill.

This has been the experience of the large municipalities contacted by DSNY—the same municipalities that Dart suggested DSNY research—and several other small and large

municipalities that also attempted to recycle Food-Service Foam. After designating Food-Service Foam, numerous municipalities end up disposing of the material at each step in the recycling process. There is no basis to expect that New York City's experience will be any different.

i. Food-Service Foam is Being Landfilled by Jurisdictions Collecting It

DSNY's research and interviews with jurisdictions that collect foam as part of their residential commingled recycling collection lead to one conclusion—Food-Service Foam is being landfilled at high costs. Food-Service Foam is crushed in commingled collections, cannot be properly sorted, and moves with other products through the MRF. The small amount of foam that is sorted properly is often stockpiled awaiting non-existent buyers and ultimately sent to landfill. Numerous municipalities end up sending Food-Service Foam collected in commingled recycling to a landfill at every step of the process.

ii. No Markets Exist for Recycled Food-Service Foam, Failing Tests for Economic Feasibility and Environmental Effectiveness

In interviews with other jurisdictions and numerous expert reports, it is clear that Food-Service Foam is not being purchased from MRFs by reclaimers and no markets exist. Businesses that do purchase foam are only interested in purchasing industrial discards or clean post-consumer Foam Packing Materials, and even then on a very limited basis.

iii. Processing Food-Service Foam is Not Cost Effective

Due to high costs, attempts to recycle Food-Service Foam are not economically feasible. Past industry-subsidized programs have failed, leaving municipalities to dispose of collected foam in a costly manner. And Los Angeles abandoned its past attempts to clean, process, and convert Food-Service Foam into a new marketable product because it was twice the cost of using virgin material.

iv. Food-Service Foam Contaminates Valuable Recycling Streams

Research and discussions with municipalities and MRFs echoed the findings of a study supported by major packaging and plastics industry trade groups—Food-Service Foam contaminates other valuable recycling streams, especially paper. Food-Service Foam flattens in commingled recycling and can be sorted as paper in the two-dimensional sorter.

v. If New York City Designates Food-Service Foam Recyclable, Then Abandons, It Will Reduce the Overall Recycling Rate

When New York City altered its recycling program temporarily in 2002, recycling rates dropped and took 15 years to recover. DSNY's research shows that industry-sponsored foam recycling programs, the offer Dart has presented, have failed over the last 30 years in the United States and Canada, leaving cities facing huge costs and no buyers. After the subsidized markets failed in Ontario, Canada, many municipalities have paid MRFs to sort the designated Food-Service Foam and then landfilled it. Other municipalities have reversed foam's designation as recyclable. These

actions can erode public understanding of, confidence in, and, as a result, participation in the City's recycling programs.

B. INTRODUCTION

1. Legislation and Determination

Local Law 142 of 2013 requires the Commissioner of the New York City Department of Sanitation ("DSNY") to determine the recyclability of single-use food and beverage containers—cups, trays, plates, and take-out containers used at restaurants and delis and recognized by the public as items thrown out after one use[1]—that are made of expanded polystyrene ("EPS"), which is commonly known as foam (hereinafter "Food-Service Foam"). To make this determination, the Commissioner must analyze whether Food-Service Foam "can be recycled at the designated recycling processing facility at the South Brooklyn Marine Terminal in a manner that is environmentally effective, economically feasible, and safe for employees." Local Law 142 defines these terms as follows:

> "Environmentally effective" means not having negative environmental consequences including, but not limited to, having the capability to be recycled into new and marketable products without a significant amount of material accepted for recycling being delivered to landfills or incinerators.
>
> "Economically feasible" means cost effective based on consideration of factors including, but not limited to, direct and avoided costs such as whether the material is capable of being collected by the department in the same truck as source separated metal, glass and plastic recyclable material, and shall include consideration of markets for recycled material.
>
> "Safe for Employees" means that, among other factors, the collection and sorting of any source separated material does not pose a greater risk to the health and safety of persons involved in such collection and sorting than the risk associated with the collection and sorting of any other source separated recyclable material in the metal, glass and plastic recycling stream.

If the Commissioner determines that Food-Service Foam can be recycled in a manner that is environmentally effective, economically feasible, and safe for employees, then the Commissioner is required by Local Law 142 to designate Food-Service Foam as a recyclable material to be collected in DSNY's residential recycling collection. At that time, the Commissioner may choose, pursuant to Local Law 142, to also designate other EPS materials,

[1] Local Law 142 (Exhibit A) defines Single Service Articles as cups, containers, lids, closures, trays, plates, knives, spoons, stoppers, paddles, straws, place mats, napkins, doilies, wrapping materials, toothpicks and all similar articles that are intended by the manufacturer to be used once for eating or drinking or that are generally recognized by the public as items to be discarded after one use.

like large foam packing materials used to package electronics ("Foam Packing Materials") or foam packing peanuts.

If Food-Service Foam is found not to be recyclable under any of the three required factors, Local Law 142 mandates that the City prohibit New York City food service establishments and stores from stocking, selling, or offering Food-Service Foam.[2] The law also requires that the City prohibit the sale of foam packing peanuts if it is determined that Food-Service Foam is not recyclable.

2. Dart's Temporary Offer to the Private Company Running City's Processing Facility

After Local Law 142's passage and before DSNY made its determination on Food-Service Foam's recyclability, the Dart Container Corporation ("Dart"), a Food-Service Foam manufacturer, proposed to create a temporary subsidized recycling program in New York City by making several different offers to Sims Municipal Recycling (Sims), the private company that operates the City's recycling processing facility at the South Brooklyn Marine Terminal. These offers were made through the month of December 2014, right up until the deadline for DSNY to make a recyclability determination under Local Law 142.

Under the offer, Dart would pay to install an optical sorting machine equivalent to Sims' existing optical sorting equipment at Sims' Brooklyn facility.[3] Dart claimed this new optical sorter could achieve 90-95% accuracy at sorting all types of polystyrene, rigid and foam. Dart would also install equipment to process Food-Service Foam at Plastic Recycling, Inc.'s (PRI), located in Indianapolis. Additionally, Dart and PRI would train Sims employees and would cover the "cost of employment" of four employees at Sims to "Service PRI's demands."[4]

Dart would then pay Sims $160 a ton ($0.08 / lb) "for at least five years at Sims' request"[5] for New York City's Baled Polystyrene (Dart required both rigid and foam). Due to the terms of its contract with Sims, the City would not profit share at all in the Dart offer. For the City to profit

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[2] Local Law 142 states: If expanded polystyrene single service articles are not designated as a recyclable material pursuant to subdivision b of this section, then, on and after July first, two thousand fifteen, no food service establishment, mobile food commissary, or store shall possess, sell, or offer for use single service articles that consist of expanded polystyrene including, but not limited to, providing food in single service articles that consist of expanded polystyrene. This subdivision shall not apply to (1) expanded polystyrene containers used for prepackaged food that have been filled and sealed prior to receipt by the food service establishment, mobile food commissary, or store or (2) expanded polystyrene containers used to store raw meat, pork, fish, seafood or poultry sold from a butcher case or similar retail appliance.

[3] Mastro letter from 2/24/16, included in exhibit D.

[4] Mastro letter from 2/24/16, included in exhibit D.

[5] Mastro letter 2/24/16 included in exhibit D.

share on Sims' sale of the City's baled recyclables, the contract requires the commodity to have a positive value for at least two consecutive years in a recognized trade journal. There has never been a price index published in a trade journal for Food-Service Foam. The mixed bales of polystyrene would be shipped to PRI's facility in Indianapolis where Dart and PRI claim the materials would be processed for end-users. PRI's Indianapolis facility would require $5.7 million in upgrades to handle Food-Service Foam. As the Dart offer to both Sims and PRI currently stands, there is no negative side for these private companies, which is not the case with the City.

3. January 1, 2015 Determination, Litigation and Additional Investigation

In a January 1, 2015 determination,[6] DSNY concluded that even though Food-Service Foam can be collected and sorted in a manner that is safe for DSNY and Sims employees, Food-Service Foam cannot be recycled in a manner that is economically feasible or environmentally effective for New York City. Consequently, Food-Service Foam was set to be banned on July 1, 2015.

In April 2015, a coalition of various foam manufacturers and businesses sued, challenging the January 2015 determination. The January 1, 2015 determination was subsequently annulled in the case of *Restaurant Action Alliance v. New York City Department of Sanitation*, 100734/15 (Sup. Ct., N.Y. County 2015), and the determination was remanded to DSNY for reconsideration consistent with the Court's opinion.[7]

The Court noted that DSNY "has discretion to choose the evidence upon which [it] relies" in making a determination, but found that the January 1, 2015 determination did not "clearly state the basis of [DSNY's] conclusions." The Court recognized that although EPS could technologically be recycled, the "tougher question is whether dirty or post-consumer single-serve EPS can be recycled, in a manner this is environmentally effective and economically feasible so to be designated as recyclable" pursuant to Local Law 142. The Court found that DSNY's conclusions regarding the lack of "sustainable market for post-consumer EPS" were not adequately explained.

In accordance with the Court's opinion, DSNY undertook additional research and analysis to update its determination. On December 30, 2015, DSNY requested updated information from Dart and from the Natural Resources Defense Council ("NRDC"), which had submitted information to DSNY prior to January 2015 determination.[8] Both the Dart and the NRDC responses incorporated materials from various interested parties. In making this determination, DSNY also considered all of the information received prior to the date of the initial

[6] January 1, 2015 determination (Exhibit B.)

[7] Decision (Exhibit C.)

[8] A copy of this letter and the February 2016 responses submitted by NRDC and Dart are Exhibit D.

determination and the information submitted during the course of the litigation. DSNY also conducted new research, which is contained in this determination.[9]

[9] A full list of the documents DSNY took under consideration in making its determination is Exhibit E.

C. BACKGROUND: NEW YORK CITY RECYCLING

1. New York City Recycling Program History

New York City's curbside recycling program began in 1989, and was slowly phased in community district by community district through 1993, when it was fully implemented citywide. Since its beginning, recycling collections have been "dual stream," requiring residents to separately sort and bag two types of recyclables: paper and cardboard as one separation and metals, glass containers, rigid plastics, and cartons in a second separation. The first stream is referred to as Paper, and the second stream is referred to as MGP, referring to metal-glass-plastic.

When DSNY started its recycling collections, the program included only newspaper, corrugated cardboard, bottles, and cans. In 1997, DSNY expanded the accepted materials, adding all types of mixed paper and bulk metal, followed by beverage cartons in 1997. The program expanded again in 2013, requiring residents to recycle rigid plastic materials in addition to bottles. The term "rigid plastic" refers to any item composed primarily of plastic resin with inflexible fixed shapes or forms such as tubs, containers, gardening pots, and toys. Rigid plastics do not include plastic bags, wrappers, pouches, or foam products, including Food-Service Foam. Film, flexible and foam plastics were excluded at the time, based on consultation with Sims about plastic markets and consideration of contamination of marketable commodities. The 2013 expansion included Rigid Polystyrene with rigid plastics since the public would find Rigid Polystyrene indistinguishable from plastic cups, trays, and tubs made of valuable plastics, like PET and HDPE. This decision sought to maximize collection of marketable plastics by making the collection rule simple for New York City residents, namely, all rigid plastics. Foam EPS products, including Food-Service Foam, are easily identified by the public, and therefore could be excluded, reducing contamination at the facility.

Designating new material for the recycling program means creating a shift in thinking among residents, as they re-learn what can and should be recycled at the curb. Residents also expect that when New York City designates a new material for recycling that the material will truly be recycled, consistently over time. Each recycling expansion in New York City has involved large-scale printing of educational and outreach materials designed to educate residents on the updated requirements. The 2013 revision of New York City's recycling requirements cost the City approximately $4.5 million for mailers to households of the City's 8.5 million residents and new labels for millions of recycling bins and recycling areas.

For these reasons, when a new material is designated for recycling, removing the materials later from the recycling program is problematic. New York City learned that hard lesson when it suspended all glass and plastic recycling collections in 2002 due to the fiscal crisis. This cut led to widespread confusion among residents and elected officials, with impacts felt throughout DSNY's overall collection programs for all materials over an extended period of time. Recycling rates had reached a high of 19 percent just prior to the cuts; when the full MGP program was reinstated, recycling rates rebounded only to around 15 to 16 percent and remained

consistently at that level. Only in the past two years, almost 15 years later, has the diversion rate increased back up to 18.9 percent with the addition of curbside organics collection.[10]

2. Current Program

i. What and How to Recycle

Recycling is mandatory in New York City, and violations of the City's recycling laws and rules are enforced by DSNY personnel. Every neighborhood in New York City receives curbside recycling collection at least once a week; every household is required to recycle the same materials. Paper/cardboard and MGP must be set out at the curb on the designated recycling collection day in a clear bag or in a labelled bin. Therefore, by its nature, the materials discarded as part of the MGP stream are dirty or become dirty when mixed with other curbside recyclables in the collection truck.

ii. Recycling Education

Recycling education takes place in a number of ways, including through a detailed website, social media channels, videos, periodic mailings, free multilingual flyers and brochures, and decals for recycling bins. DSNY attends community meetings and events, conducts trainings and site visits, and makes recycling information available by calling 311, the city's general service helpline. DSNY coordinates with other agencies on institutional recycling, and also funds non-profit organizations, including GrowNYC, to provide targeted recycling outreach and education, including events, community meetings and workshops.

DSNY and the NYC Department of Education work closely to coordinate the teaching and practice of recycling among students, teachers, custodial engineers and administrators. Schools compete for prizes awarded annually to student/teacher groups for innovative projects of waste reduction, reuse, composting, recycling, and neighborhood cleanup. In public schools, EPS foam trays, which were once used to serve student lunches, have been replaced due to parent involvement in seeking more sustainable alternatives that are suitable to be included in the Schools Organics Recycling Program, which began in 2012.

iii. Expansion of Diversion Programs

As part of the Administration's comprehensive sustainability plan, *One New York: The Plan for a Strong and Just City*, DSNY has an ambitious goal of sending zero waste to landfills by 2030. To achieve this goal, DSNY seeks to promote and support a system of sustainable solid waste management that builds on the City's environmental initiatives to reduce the amount of waste we dispose of and maximize recycling. An important component of our zero waste goal is to continue to expand the City's residential organics collection program.

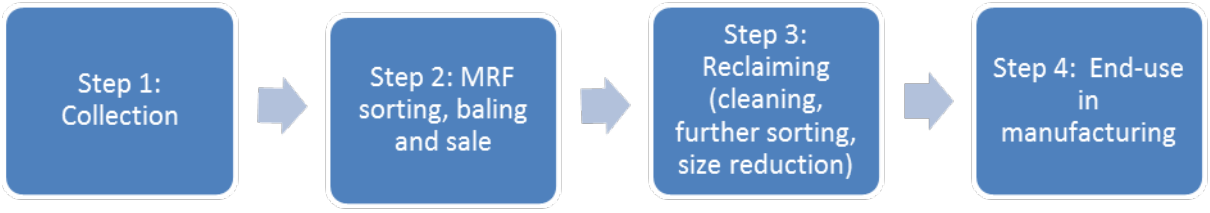
[10] DSNY publishes statistics on diversion rates monthly on its website: http://www1.nyc.gov/assets/dsny/about/inside-dsny/annual-and-monthly-statistics.shtml

iv. City's Change to Single-Stream Recycling

In addition to the expansion of the City's organics collection program, the City has committed to transitioning to a single stream recycling program by 2020. This means that residents will be able to commingle all of their recyclables together: paper, cardboard, metals, glass, rigid plastic, and cartons will all go in the same bin. The City anticipates that moving to single-stream recycling will help simplify recycling for citizens, make it easier to participate in recycling where storage is limited, and increase diversion rates in order to help the City meet its zero waste goals.

3. The Recycling Process

Broadly, there are four steps in the process to achieve recyclability. The individual players may vary depending on the material stream, but the same steps are needed to prepare a material to re-enter the industry as a manufacturing feedstock.



For a typical large municipality, the steps are as follows:

1) Collection: Designated recycling material is collected as part of a commingled collection program (like DSNY's MGP program).

2) Material Recovery Facilities ("MRF") Sort, Bale, and Sell Material: Commingled collections are delivered to a MRF, where it is placed onto a sorting line with specialized equipment geared to sort each material—for example, magnets pull off ferrous metal cans, and optical sorters use visual sensors to separate plastics by resin type. The sorted material is then packaged into commodity bales that meet buyer specifications,[11] which are then offered for sale to reclaimers.

3) Reclaiming/Cleaning/Processing: Most material baled by MRFs require further cleaning and processing before it can be used in manufacturing. A reclaimer processes the MRF

[11] While many specifications exist specific to each buyer, two industry organizations, the Institute of Scrap Recycling Industries (ISRI) and the Association of Plastic Recyclers have worked to create model bale specifications of common commodities that can be used in the marketplace. Sims is a member of both of these organizations and provides input into the development of model bale specifications. http://www.isri.org/docs/default-source/commodities/specsupdate.pdf http://www.plasticsrecycling.org/markets/model-bale-specs

bales through additional sorting and cleaning, and ultimately turns the collected material into pellets, flakes, or other raw material that can be used as feedstock by a manufacturer.

4) Reuse/End-Use: An end-user purchases what is now feedstock material from the reclaimer and makes it into a new product. Reclaimers can also be end-users in some instances.

To conduct the mandated Local Law 142 analysis, DSNY must carefully consider the entire recycling process to ensure that during the sorting, baling, reclaiming and reuse stages there is a high capture of Food-Service Foam, ensuring that a significant amount of the material is not disposed of in a landfill or incinerator at any of these stages.

4. Plastics Recycling

Plastic products are highly diverse. Broadly, New York City identifies plastic products in four general categories: rigid plastics, flexible plastics, film plastics, and foam plastics. As described above, rigid plastics are composed primarily of plastic resin with inflexible fixed shapes or forms. Flexible and film plastics are the plastic resins that are made into bags, wrappers, pouches and squeeze tubes, where the shape of the plastic can be manipulated. Foam plastics are plastic resins consisting of many air pockets that are formed into a solid shape.

Rigid or harder plastics are far easier to recycle than foamed plastics. Compared to foam plastics, rigid plastics are heavier and do not easily break into smaller pieces. This makes them better at remaining intact through compaction in collection and in sorting. Rigid plastics also do not easily become tangled in recycling equipment like many film plastics, such as plastic bags. This means that solid bales of homogenous rigid plastic materials can be successfully created through the complex sorting process at the MRF stage of the recycling process. For example, Sims, and MRFs generally, achieve a high yield rate for PET and HDPE plastic products, meaning these materials are accurately sorted into their designated bales. Rigid plastics, as discussed in greater detail below, typically do not contaminate other streams. In addition, most rigid plastics have viable markets.

In contrast, foam products, are extraordinarily light weight. Ninety-eight percent of the weight of EPS Foam is comprised of air.[12] Foam-Service Foam, specifically, flattens and breaks into small pieces when pressure is applied to it. Its light weight and tendency to break apart and flatten causes it to contaminate other streams, particularly paper. Food-Service Foam can resemble the 2-dimensional properties of paper when it is flattened and broken into small pieces. Other materials that are able to maintain their shape through the collection process are more accurately recognized by the optical sorter and are sorted properly.

The value of recycled material is based on the amount of resin that can be recovered, and it takes a much higher volume of EPS Foam to generate the same weight as a smaller volume of rigid plastic, such as PET. Thus, bales of EPS Foam generated at a MRF through the same sorting

[12] http://www.genpak.com/Literature/Foamfacts.pdf

process as rigid plastic material will contain a low weight and low density. This low density makes it difficult to transport bales of EPS Foam in a cost-effective manner. In addition, the light weight of EPS foam makes it difficult to keep contamination at a low enough percentage of the overall weight of the material being offered for sale by the MRF. When EPS is contaminated with food residue, the weight of such residue can easily overwhelm the weight of the low-density EPS itself.

i. Sources of Plastics for Recycling

There are different sources of plastics for recycling. These namely fall under three categories:

a. Pre-Consumer

Pre-consumer plastic is typically byproducts produced in the factory (i.e. cuttings or extra pieces that left after a plastic product is manufactured). It is called "pre-consumer" because it has never been used. Pre-consumer plastic waste tends to be clean, consistent and homogeneous (of one variety), because it comes from standard manufacturing process that generates the same byproduct over time.

b. Post-Consumer

Post-consumer plastic consists of plastic products that have been used, and subsequently discarded. Typically, post-consumer plastics can be further divided into "food service" and "non-food service" items. Post-consumer food service plastics are often contaminated with food residues while non-food service items tend to be cleaner.

c. Post-consumer commingled material

New York City's curbside collections of mixed metal, glass, plastics and cartons consist entirely of post-consumer material. Residents put a range of designated materials in their recycling bins. The mix of materials, called commingled materials, is picked up and compacted in a truck during municipal curbside collections. Post-consumer, commingled plastics are the most costly and laborious to process as recyclables. They are not homogeneous, so they need to be sorted. Food-service plastics are particularly dirty, having been soiled with food and then further dirtied by mixing and compacting with other items in the back of a collection truck.

ii. Plastic Markets

As DSNY's economic consultant, Christopher Behr notes, "Recycling markets for many waste products (including differentiated types of paper, plastics and metals) are well-established in many parts of the country."[13] Many rigid plastics, particularly PET (Polyethylene Terephthalate) plastics, commonly found in bottles, have particularly strong, well-established markets. In contrast, flexible and foam plastic do not.

[13] Behr Discussion of Economic Feasibility and Markets (Exhibit F) at 3.

Most pricing of recyclable material that a MRF endeavors to sell is based on index pricing. An index is a means of looking at the average composition of bale of recycled material, and tying this composition to average prices over a set period. This information enables the calculation of the market value of an "average" ton of that material, which is then published in trade journals. This average pricing is typically used as the basis for contracts between municipalities or regions and their recyclers or MRFs. There is no index published in any trade journal for Food-Service Foam.

For the end-user, typically a manufacturer, recycled material feedstock directly competes with virgin material on the commodity markets. Manufacturers make purchasing decisions based on quality, price, and consistency of supply. The more effort it takes to prepare recycled materials to compete in quality and quantity with virgin feedstock, the more expensive it will be to end-users and the less competitive on the market.

5. Post-Consumer Food-Service Foam has Unique Challenges to Being Economically Recycled

Different types of polystyrene plastic exist—including rigid and expanded. Expanded or foam can be pre-consumer or post-consumer. Pre-consumer foam includes "industrial scrap" EPS that are sourced from pieces trimmed in factory production as well as finished product that has never been used. Pre-consumer is very clean and homogenous, due to the source.

Post-consumer foam has been used and is either "Food-Service" (used to hold liquids or food) or "non-food service", sometimes called "packing" foam. Typically the latter consists of cushioning material for shipping delicate items, such as electronics. Post-consumer Food-Service Foam is often called "dirty" due to the presence of food residues that adhere to it.

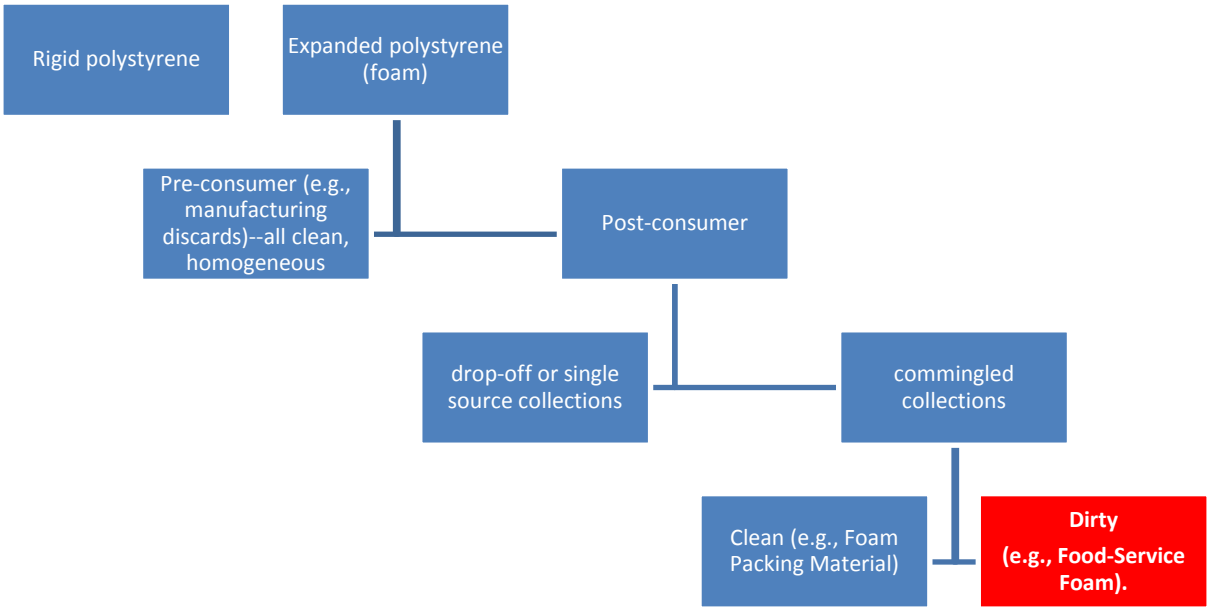
Local Law 142 addresses only Food-Service Foam and the determination as to recyclability is solely based on whether post-consumer Food-Service Foam can be recycled. It is not based on the recyclability of any other foam product.

The highest quality EPS material for recycling is industrial scrap. This material does not appear in DSNY's waste stream since DSNY collects from residents and not from industrial or business sources.

The lowest quality EPS material is post-consumer commingled Food-Service Foam, the type of material that would be collected in DSNY's recycling stream. Because of the commingled nature of DSNY's curbside recycling program, even if a resident placed clean foam into the recycling bin, the clean foam would become dirty and contaminated because of the other dirty post-consumer material that is collected as part of DSNY's commingled MGP program. With respect

to commingled recycling collection programs like DSNY's, recyclers consider Food-Service Foam dirty even if some items have not touched food.[14]

The chart below highlights the differences between the types of polystyrene. As noted, "Dirty" or Food-Service Foam is the only material at issue in this determination. It is the lowest quality EPS available and requires the most effort and cost to clean and prepare into a feedstock material for manufacturing.



As the quality of EPS declines, the cost and complexity of sorting and reclaiming the foam increases, reducing the economic viability of the program. For example, while some reclaimers accept clean foam for processing, there appears to be none or virtually none that process dirty Food-Service Foam.

i. Food-Service Foam that omes into contact with contaminants in commingled collections will be more contaminated than rigid plastics.

Unlike rigid plastics, EPS's chemical structure attracts oils, grease, and other nonpolar molecules[15] within its polymer chains,[16] making it nearly impossible to completely

[14] Note that Sexton Consultant learns in discussions with over 100 recyclers that Food-Service Foam collected in residential recycling programs is always considered dirty even if it is not touched by food. See, Sexton Report at 5.

[15] Zhang, Yanyang, Bingcai Pan, Chao Shan, and Xiang Gao. "Enhanced Phosphate Removal by Nanosized Hydrated La(III) Oxide Confined in Cross-linked Polystyrene Networks." *Environmental Science & Technology Environ. Sci. Technol.* 50, no. 3 (2016).

clean. Another aspect of EPS's structure that makes it hard to clean are the air pockets in the very light material. Lipids and other nonpolar molecules become easily trapped and absorbed when EPS is exposed to them.[17] Other materials collected by DSNY as part of its MGP stream do not absorb residue in the same manner that foam does.

ii. Foam's light weight poses challenges to efficiently transport the material, and densification, one of the strategies to improve these economics is not recommended for dirty Food-Service Foam per industry standards.

Densification is a strategy used to compact foam to generate a weight to volume ratio to make shipments of the material financially viable. Facilities that densify foam, install densification equipment into which clean, homogeneous foam items are fed to generate physically compacted blocks or thermally transformed ingots of polystyrene. These facilities also set aside space to store the material until sufficient quantities are aggregated to generate a truckload.[18]

Industry prefers densification as a strategy for clean foam, and recommends against densifying dirty foam because the compaction and/or thermal process impedes the ability to clean the material[19]. Densification is not a viable strategy for Food-Service Foam received at Sims. It does not have the physical space or storage capacity to clean, densify, and store EPS. Rather, it would need to sort the EPS and create bales using the same equipment used on other types of material collected as part of DSNY's MGP stream. As a result, transport of collected Food-Service Foam is difficult to accomplish in an economically feasible manner.

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[16] García, María Teresa, et al., "Study of the Solubility and Stability of Polystyrene Wastes in a Dissolution Recycling Process." *Waste Management* 29, no. 6 (2009).

[17] https://stab-iitb.org/newton-mirror/askasci/chem03/chem03994.htm

[18] See Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[19] http://www.epspackaging.org/images/stories/EPS_Recycling_How-To_Manual-lores.pdf

D. RESEARCH ON FOAM SORTING, CITIES COLLECTING FOAM & RECYCLERS

There is a clear distinction between collecting a material as a recyclable and actually re-using it. An item can be added to the accepted collection list but to be recycled and make its re-use feasible, the material must be sorted and baled by a MRF, purchased and processed by a reclaimer; and then sold to buyers that value it and reuse it for a purpose that keeps the material from being landfilled.[20] Simply because a material is being collected in a municipal recycling program does not mean the material is actually being recycled. Local Law 142's mandate requires DSNY to examine the feasibility of the entire recycling process—the sorting, baling, selling, cleaning, processing, selling, and reuse—for Food-Service Foam in today's market. Dart's offer to Sims to install equipment and temporarily purchase the Food-Service Foam for five years does not remove the DSNY Commissioner's responsibilities to analyze Food-Service Foam's recyclability under Local Law 142's mandate.

Pursuant to Local Law 142, DSNY, as part of its determination, is mandated to review, among other things, whether a significant amount of Food-Service Foam would be landfilled if it were designated as a recyclable and whether markets exist for this material. If a significant amount of Food-Service Foam would be landfilled even if it were collected as a recyclable or if DSNY finds that there are no sustainable markets for the material, recycling Food-Service Foam would not be environmentally effective or economically feasible under Local Law 142. Additionally, Dart's subsidized offer is only for five years, and DSNY needs to plan its recycling program based on long-term considerations about the markets for its recyclable materials. DSNY cannot make a decision about whether a particular material should be included in its recycling program based solely on a temporary subsidized offer to DSNY's recycling contractor that has no direct benefit to the City.

DSNY's research has demonstrated that there have been 30 years of failed attempts to subsidize the Food-Service Foam recycling process. And, notably, no example of successful municipal Food-Service Foam recycling has emerged since DSNY's initial determination. If after Sims' five-year profit offer expires no true market arises, as has been the case with subsidized programs in other jurisdictions, Food-Service Foam will become contamination in DSNY's recycling stream in the same way that it has with other cities.

Food-Service Foam is difficult to recycle in part because it flattens and breaks up into many small pieces during collection or in the sorting equipment. Often, pieces end up with other commodities, like paper, having the potential to increase paper recycling costs or de-value valuable paper bales. As discussed above, collected Food-Service Foam is also difficult to transport effectively because of its light weight and relatively heavy contamination burden. Investigations into a list of 137 processors and end-users—purchasers—provided by Dart's

[20] See Sexton Consulting Report, at p. 15, explaining that "recycling" includes a reuse to the original value-level, like a can that is collected, melted, and made into another metal can. In contrast, Manufacturing Discards of Industrial Foam that are turned into Foam packing peanuts is an example of downcycling,because the Foam packing peanuts will be thrown-out after that second use.

consultant Berkeley Research Group found that none of the 137 entities purchased bales of dirty Food-Service Foam.[21]

Only a small number of jurisdictions in the U.S. and Canada collect Foam, having found the cost to collect, sort, and process it to be twice the cost to use virgin material.[22] DSNY contacted the eight largest jurisdictions identified by Dart that supposedly have a curbside recycling program for Food-Service Foam and researched the recycling programs of these jurisdictions. These jurisdictions echo what DSNY already found in its research; there is no market for the purchase and ultimate re-use of collected Food-Service Foam. Ultimately, some municipalities have been forced to pay MRFs to sort it and then find no market to sell it at the reclaimer stage for the Food-Service Foam.

This research, discussed below, was taken into consideration in this Determination's conclusion.

1. 30-Year History of Failure for Subsidized Markets of Foam Recyclers Failing

For the past 30 years, there have been industry-supported attempts to recycle Food-Service Foam. All such attempts have failed after the subsidy ended. It has never been economically feasible or environmentally effective to recycle Food-Service Foam.

In 1989, eight polystyrene manufacturers banded together to form the National Polystyrene Recycling Company (NRPC) with the stated goal of recycling 250 million pounds of EPS by 1995. To try to achieve this goal, in 1990 through 1991, the eight manufacturers built and/or acquired six EPS recycling plants located in or near six different major metropolitan areas in the United States, including one in New York City. By 1993, all six of these EPS recycling plants had shut down.

The plants that NPRC built or retrofitted focused on recycling Food-Service Foam. DSNY's expert consultant Michael Schedler[23], who has worked for over 30 years in the post-consumer plastic recycling industry, notes that the plants failed as they encountered excessive food contamination, where the weight of the residue often exceeded the weight of the package. They found that recycling EPS food service packaging could not be done cost effectively. All six plants were heavily subsidized by NPRC for about two years, but in the end, the NPRC members chose to put the money they were spending in the plants into public relations. When the subsidies ended, the plants closed.

More recently, as discussed in more detail below, attempts in Canada to recycle Food-Service Foam faced the same difficulty and ended similarly. The Canadian Polystyrene Recycling Association (CPRA) funded an EPS recycling plant, but the plant ended up closing in 2008.

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[21] Sexton Consulting Report included in Exhibit D at 19.

[22] See Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[23] Schedler Report (Exhibit G).

Canadian municipalities were not able to overcome "the bad economics of collecting, handling and shipping Food-Service Foam."[24] While some municipalities in Ontario have continued to collect Food-Service Foam after the subsidized EPS recycling plant shut down, they have not been successful in finding a market for the material or in having it actually be reused and recycled.[25]

Schedler notes that, since the NRPC attempt, other attempts to create sustainable markets for Food-Service Foam in the United States have continued to fail. Schedler concludes: in both the United States and Canada, "despite the ongoing effort and millions of dollars spent by both the public and private sector, there is no successful, non-subsidized, economically viable ongoing effort that is recycling post-consumer food service EPS packaging" [food service EPS packaging is material such as clamshells and cups].

Schedler's report is corroborated by a report from DSM Environmental Services, Inc. (DSM)[26] regarding the economic feasibility of adding EPS foodware to the City's MGP stream. DSM explained that "[p]ast efforts to reclaim soiled EPS single-use food and beverage containers have not succeeded over the long term."[27] DSM observed that the economics of Food-Service Foam recycling are not favorable and the markets unreliable."[28]

In regards to the current outlook on recycling Food-Service Foam, Schedler summed up the lack of markets for EPS from commingled municipal collections in discussions with DSNY as follows:

> There are no specifications for a mixed bale of post-consumer PS packaging including amongst other materials EPS because no one is buying it. Because no one is buying it no one is making it. Because no transactions are taking place none of the various price reports are tracking it since there is nothing to track.[29]

2. No Market Exists for Recycled Post-Consumer Foam

DSNY consulted with an economist for input on whether a market exists for recycled Food-Service Foam. Christopher Behr observes that recyclables are low-value commodities that are purchased as inputs to a manufacturing process. The recycled materials are typically either substituted for or blended with virgin materials. Behr notes: "Since manufacturing businesses

[24] Schedler Report at 5.

[25] See Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[26] DSM Report (Exhibit H).

[27] DSM Report at 8-9.

[28] DSM Report at 12.

[29] DSNY discussions with Mike Schedler.

must remain competitive, their willingness to pay for recyclables rises only up to the price of virgin materials after accounting for any extra costs for using recyclables in the manufacturing process."[30]

Behr states that "recycling markets for many waste products (including differentiated types of paper, plastics and metals) are well-established in many parts of the country." However, he observes: "The market for recycled EPS cannot be characterized as active and efficient. The volumes of recycled EPS are extremely low and generally consist of raw materials that are relatively clean, either because they are surplus by-products of EPS production or accumulated bundles of individual customers' recycling initiatives at say, packaging stores."

Behr states that "the marketability of recycled EPS depends on whether it is "clean", which largely characterizes the volumes generated as an excess by-product of manufacturing, or "dirty", which would be obtained from recycling facilities" such as food service foam that would come out of DSNY's MGP recycling program."

In reviewing the status of EPS recycling, Behr states: "Clean recycled EPS has been readily integrated into the manufacturing processes of some businesses. While the traded quantity of clean recycled EPS is relatively low, there is sufficient demand from buyers for a market price to be established in trade journals." In contrast, Behr finds that "evidence on the handling of dirty post-consumer EPS in the New York City area indicates that there is no reliable source of demand for this product – which means, there is no market. Behr concludes: "Given the lack of demand for recycled post-consumer EPS and the high costs of converting dirty EPS into a marketable product, there is no evidence of a market for this material."

This finding is confirmed in a recent report from the World Economic Foundation, the Ellen MacArthur Foundation, and McKinsey and Company.[31] These organizations recognized expanded polystyrene as a "hard-to-recycle material" citing problems with contamination, both of the expanded polystyrene from organic matter [food] and problems with expanded polystyrene contaminating other recycling streams.[32] Ultimately, the report suggested that more recyclable plastics material be used in place of polystyrene in order to promote effective recycling.

[30] Behr Report at 2-3.

[31] [1] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy — Rethinking the future of plastics* (2016, http://www.ellenmacarthurfoundation.org/publications), pg. 52.

[32] https://www.ellenmacarthurfoundation.org/assets/downloads/New-Plastics-Economy_Catalysing-Action_13-1-17.pdf, at 29-30.

3. Food-Service Foam Breaks in Sorting; Mixes with Other Valuable Recyclables

i. MRF Sorting

a. Plastic Partners Material Flow Study[33]

In late 2016, Plastic Partners released a 2015 MRF Material Flow Study Report commissioned by the Carton Council, American Chemistry Council, National Association for PET Container Resources, the Association of Plastic Recyclers, and the Foodservice Packaging Institute. The study was performed by a study team consisting of Resource Recycling Systems and their partners Reclay StewardEdge and Moore Recycling Associates. This report documents a standard type of study performed to allow container and product manufacturers to determine which type of container and material most successfully handles the MRF sorting stage of the recycling process.

The study documented the flow of materials through sorting machines at five MRFs, four processing single-stream collections and one dual-stream. It analyzed how well different types of materials made it successfully into their targeted bale, and what materials, not currently accepted for recycling, could potentially be recycled using the technology in existing MRFs. This report focused on four product forms: plastic bottles, plastic cups, plastic containers, plastic clamshells made of seven plastic resins: PET, colored HDPE, natural HDPE, polypropylene (PP), PS, PS Foam, polylactic acid (PLA).[34]

Comparing the performance of containers, clamshells, and cups (the "Food-Service" categories) PS Foam was by far the worst performer of the seven resins. Only 7 percent of PS Foam ended up in its targeted bales.[35]

Resin	Target Bale	Overall	Bottle Only	Container/ Clamshell/Cup
PET	PET	87%	89%	57%
cHDPE	cHDPE	81%	86%	43%
nHDPE	nHDPE	87%	87%	N/A
PP	Mixed Plastic	40%	30%	42%
PS	Mixed Plastic	22%	N/A	22%
PS Foam	Mixed Plastic	7%	N/A	7%
PLA	Mixed Plastic	29%	N/A	29%

[33] Plastic Partners Report (Exhibit I).

[34] Plastic Partners Report at 2.

[35] Plastic Partners Report at 60.

In particular, PS Foam had high loss rates to the paper stream at the single-stream MRFs, and had a tendency to flatten and break into smaller pieces. None of the PS Foam clamshells studied were found still whole when the material was sorted after going through the MRF equipment. "Most were broken up into small pieces and therefore easily confused with paper. Some pieces were observed in the glass streams as part of the glass mix or one of the screened streams."[36]

Since New York City is in the process of planning a switch to single-stream recycling within the next five years, the results of the single-stream MRFs are particularly pertinent to our planning process. We would expect, based on the results of this study, that as much as 75 percent of PS Foam clamshells, 60 percent of PS Foam cups,[37] would end contaminating our paper stream. The majority of the rest of the PS Foam cups were directed to residue as ***none of the MRFs had a market that accepted PS Foam as part of the mixed plastic bale***.

PS Foam, by design, is lightweight, and the study concludes that its light weight can increase product loss to the paper streams in a single stream MRF.[38] The Report concluded that packaging sorted more successfully when it maintained its three-dimensional shape. "[T]here is a minimum crushing force that the container would need to withstand and maintain a 3-D shape to reduce likelihood of traveling with the paper." Food-Service PS Foam, which will never withstand this crushing force, would require manual sorting at a pre-sort stage to have any likely possibility for successful sorting.[39]

However, the report notes that a manual pre-sort is not common and that none of the MRFs were set up to perform such a sort. [40] And since none of the MRFs had a market that accepted PS foam as part of a mixed plastic bale, the expense of pre-sorting foam was unlikely to be worthwhile to a MRF. [41] Moreover, because much foam arrives at the MRF already crushed from collection trucks, pre-sorting is still likely to be of limited effectiveness. At one of the MRFs studied, a pre-sort of foam of foam succeeded in pulling off only 42 percent of the Food-Service Clamshells.[42]

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[36] Plastic Partners Report at 54.

[37] Plastic Partners Report at 54 and 58.

[38] Plastic Partners Report at 4.

[39] Plastic Partners Report, at 61 - 62.

[40] Plastic Partners Report, at 62

[41] Plastic Partners Report at 4.

[42] Plastic Partners Report. at 54.

b. Sims 2016 EPS Throughput Test

To gain an understanding of how EPS would behave in the Sims MRF specifically, DSNY, in partnership with Sims, ran a one-day throughput test on August 30, 2016 to observe how Food-Service Foam would sort using the Sims MRF equipment, and to gain insight into EPS recovery potential at the MRF. [43]

At Sims' direction, Food-Service Foam was mixed with incoming MGP loads on the MRF floor prior to moving the material onto the conveyor for sorting. One of the optical sorters was calibrated to identify and positively sort for polystyrene, including rigid polystyrene, and expanded polystyrene (both Food-Service Foam and non-Food-Service Foam). The recovery belts were run at one-third of the normal speed to allow for better observation of the behavior of Food-Service Foam in the sorting equipment, and to maximize the potential for the optical sorter to successfully identify the Food-Service Foam items. Three test batches were run with different quantities of MGP mixed with the test Food-Service Foam to see how commingling would affect EPS recovery. The test was not designed to ascertain yield rates under normal operating conditions.

Under these test conditions, when accounting for contaminants, an average of 56% of the test Food-Service Foam was recovered appropriately through the optical sorter calibrated for polystyrene. As described in Exhibit J, the Sims Test Summary, the recovery rate decreased as more MGP was mixed with Food-Service Foam. The EPS recovery rate was lowest in the batch that mixed the highest percentage of MGP, which most closely reflects normal operating conditions. As such, DSNY, in consultation with its expert Michael Schedler, concluded that the recovery will be far lower when the EPS is mixed with more material and the belts are run at full speed. This conclusion is consistent with the Plastic Partners Report, which showed only a 7 percent capture rate for Food-Service Foam under normal MRF operating conditions. Sims has also confirmed that the recovery will be lower when the belts are run at full speed.[44]

A significant portion of EPS material in the Sims test sorted improperly with other two-dimensional items, such as paper.[45] Food-Service Foam is lightweight, with a tendency to break into small pieces and flatten, and end up being sorted with paper. This issue is increasingly problematic in single-stream facilities that sort paper recycling commingled with MGP. DSNY plans to move to single stream recycling within the next 5 years. These issues are confirmed by other sources as well. Discussions with other municipalities indicate that that foam collected with recyclable material often ends up being sorted out with paper at their MRFs as well.[46]

[43] The results of this test are summarized in Sims EPS Sorting Report (Exhibit J).

[44] Sims EPS Sorting Report at 5.

[45] Sims receives paper in the MGP collection from bags that incorrectly contain all streams commingled. Sims endeavors to sort and market this material even though it is not designated for the MGP stream.

[46] Section 7 of this determination

DSM also confirms these concerns in its report on the economic feasibility of adding Food-Service Foam to New York City's recycling system. This report notes that "EPS single-use food and beverage containers can be entrained in the film and paper" during MRF sorting "because it is likely to behave like these materials."[47] DSM concludes that the net result of EPS being sorted to paper and film, combined with other MRF losses such inaccuracies at the optical sorting stage, "is unknown but can be assumed to run from 20 to 30 percent of the EPS single-use food and beverage containers entering the SIMS facility."[48] As the Plastics Partners Report and the 2016 Sims throughput test shows, DSM's estimate of 70 to 80 percent recovery at the MRF stage is likely overly optimistic, particularly when considering DSNY's transition to single-stream recycling in the near future.

4. DSNY Visit to PRI and Problems at Facility

On April 15, 2016, DSNY, along with plastics recycling expert Mike Schedler, visited the PRI Recycling facility in Indianapolis to determine the facility's capacity to process the Food-Service Foam that would be sent to the facility if New York City designated it as recyclable under LL 142's mandate, under the subsidized program being proposed by Dart.

DSNY's main conclusion after visiting the facility was that PRI's operations to process Food-Service Foam from New York City remained in the Research and Development phase. Mike Schedler confirmed DSNY's conclusion, noting in his report:

> The system that was observed at the PRI plant in Indianapolis is not fully operational from either a production, water treatment or safety standpoint. To make it so, extensive retrofits would have to be completed. Even with PRI's proposed retrofits, there is no substitute for continuous running at production volumes to fully understand the wide range of issues that this type of post-consumer feedstock carries with it. [49]

Dart submitted a video to DSNY in February 2016 entitled "Plastic Recycling Inc. Ready to Recycle New York City's EPS" and PRI's Marketing Manager, Brandon Shaw submitted an affidavit that PRI would be prepared to start recycling polystyrene in April 2015 "at the latest" and that its "method for processing polystyrene is not a proprietary technology" and the "process we would use to process Sims' bales is nothing new." Despite these assertions, DSNY's April 2016 site visit to PRI showed that PRI's polystyrene recycling facility was actually *not currently operational*. At the time of DSNY's visit, PRI's facility was still assembling and installing equipment, waiting for new equipment to arrive, determining equipment set-up and layout, and harmonizing the timing of the machines to run in unison together. DSNY and Mike Schedler

[47] DSM Report at 8.

[48] DSM Report at 8.

[49] Schedler at 11.

also noted engineering and safety issues with the set-up of the facility. Additionally, during the course of our visit, a piece of equipment clogged and the system shut down. There is no back-up equipment, so when one piece shuts down, the entire system goes offline. It took over an hour for the system to get back up and running. PRI did note that they planned to bring in a consultant to help them work through these issues.

It was clear from DSNY's visit that PRI would need to spend significant additional, capital in order to fully operationalize. As of April 2016, the cost to build this facility was $6.1 million and at that time, many pieces of equipment needed to be replaced. In addition to the capital costs, PRI did not yet have a good understanding of what the ongoing operating costs to run the facility would be since the facility was not yet running beyond the testing stage, and many changes were still needed. Since ongoing operational costs and stability of operations are critical pieces of information to determine the operation's viability, DSNY was unable to conclude whether the operation would ultimately be sustainable.

At the time of DSNY's visit, PRI told us they had tested the operation using clean post-industrial cups from Dunkin Donuts, post-consumer foam cups from Chick-Fil-A (which can be considered clean when compared to dirty Food-Service Foam coming out of a MRF) and clean egg cartons from a Publix supermarket drop-off program. PRI told us they had also run a few bales of mixed PS/EPS from Titus, a secondary MRF in California and the few Sims bales from DSNY's 2014 sort test. DSNY observed that PRI had stockpiled bales from a MRF in Canada (unclear if any were processed), and additional bales of Chik-fil-A and Dunkin Donuts.

PRI revealed during DSNY's visit that taking New York City's Food-Service Foam would be PRI's first experience processing post-consumer MRF EPS. PRI stated that it has not been pursuing a feedstock of foam from other cities. Dart and PRI both indicated that the reason that the facility has not pursued MRF material from other cities on a recurring basis is because the facility needs to reserve the capacity to potentially receive material from New York City. However, in failing to take in PS/EPS bales from other cities, PRI has not tested their system or fine-tuned its equipment. In fact, the PRI facility had only been "operating" since approximately January 2016. To date, over one year later, DSNY has received no updated information indicating that the PRI facility is fully operational nor about the stability of operations or the ongoing operational costs and whether those would be justified after the conclusion of the subsidy.

5. The Sexton Report Concludes that Food-Service Foam Is Not Recyclable

Sexton Consulting (Sexton) investigated the 137 companies mentioned in the Berkley Research Group ("BRG") report submitted to DSNY by the Foodservice Packaging Institute in 2014, [50] BRG had indicated these 137 companies are processors and/or end users of recycled EPS and issued a report on the recyclability of post-consumer Food-Service Foam. Sexton determined that

[50] BRG Report (Exhibit K).

"we do not find anything resembling an actual market for post-residential consumer plastic foam."[51]

In fact, 63 of the companies from the BRG list stated that they do not recycle EPS at all. A number of these companies called EPS "garbage" or "trash." Some of these companies also noted that EPS cannot be recycled. In addition, 18 companies told Sexton that they recycle only clean EPS and do not accept Food-Service Foam, and 14 companies no longer seemed to be in business.[52]

Only 12 of the 137 companies on the BRG list indicated that they accept post-consumer foam. Of these 12, six indicated that they would only take clean packing foam and not Food-Service Foam. Of the remaining six companies, two stated that they would charge to pick up the EPS and that "the cost of picking up the EPS would be more than the cost of the material in the truck." Additionally, these two companies would only pick up the material in the Boston area. One company indicated that it takes EPS but because of space, it can only take one truckload per week. Another company takes EPS solely through a drop off program in Visalia, California. The remaining two companies indicated that they accept EPS generally but would not pay for it.[53]

As part of its review, Sexton also investigated Nepco and Burrtec, both important to the lower court's finding that a Food-Service Foam market existed, as well as Rapac, a polystyrene recycler. While Dart has represented that Nepco accepts 800,000 pounds of recycled EPS per month, Nepco own website does not include food service EPS recycling among its services.[54]

In its research on Burrtec, which is a major recycler in California, Sexton found that it had previously conducted subsidized pilot program with Dart to handle used foam coffee cups. The

[51] Sexton report at 2.

[52] Sexton report at 4 and 19-29.

[53] Sexton report at 19 and 31-34.

[54] DSNY has reviewed Burrtec's February 2, 2016 letter from Richard Crockett to Bridget Anderson and NEPCO's February 23, 2016 affidavit from its sales director, Tae Hwang. While Burrtec claims that it has been recycling postconsumer EPS for several years, Burrtec provides no details on how much of the successfully sorted and sold material is comprised of dirty Food-Service Foam. Notably, Burrtec lists Riverside, California as the largest community that Burrtec services; however, Riverside has confirmed in interviews with DSNY, discussed infra, that its dirty Food-Service Foam cannot be effectively recycled and an industry website, www.homeforfoam.com, specifies that Riverside has a clean foam collection program only. Further, NEPCO has not indicated that it has any interest in purchasing a bale of Food-Service Foam. Similarly, Dart has submitted February 19, 2016 letter from Styro Recycle LLC, an EPS reclaimer, but Styro's own website shows that it accepts only clean foam from drop-offs, not bales of dirty Food-Service Foam. http://www.styrorecycle.com/what-we-accept/. Styro Recycle will also pick up clean foam from businesses – but charges businesses for this service. http://www.styrorecycle.com/new-customers/.

pilot program, however, was discontinued. On its website, Burrtec states that "the Upper and Lower Desert Cities [which includes all or major portions of Los Angeles, San Diego, etc.] are only accepting foam packaging blocks" (such as the foam blocks that protect new televisions or computers).

Similarly, Sexton found that Rapac, a large recycler of EPS, will only take EPS that meets the specifications of the Alliance of Foam Packaging Recyclers (AFPR). Rapac noted that AFPR "does not accept meat trays, cups, egg cartons or disposable food service items for recycling."[55] Accordingly, Sexton determined that Rapac is not in the business of recycling post-consumer Food-Service Foam.

After investigating the 137 companies listed in the BRG report, Sexton concludes "that recycling dirty polystyrene foam – the household food and beverage containers from the DSNY collection stream – in an environmentally effective and economically feasible manner is not realistic now or for the foreseeable future."[56]

The DSM Report confirms Sexton's findings. DSM considered the companies cited as commercial polystyrene processors in the BRG report submitted to DSNY by the Foodservice Packaging Institute in 2014, and concluded that these companies do not process dirty Food-Service Foam. DSM noted that its discussions with Dart and with the consultant Moore Recycling indicate that they know of no other potential buyer for bales of dirty mixed polystyrene aside from PRI's proposed facility.[57]

6. EPS Industry Information Indicates That Only Clean Foam Is Recycled and Not Food-Service Foam[58]

i. EPS Industry Alliance's Website

In its research of the Food-Service Foam recycling market, DSNY consulted EPS industry websites, including the EPS Industry Alliance (EPS-IA), the largest industry alliance for EPS. Its website provides an extensive section on "Recycling EPS", targeted to manufacturers, industry, consumers and businesses, that notably emphasizes recycling of Foam Packing Materials only; in fact, EPS-IA repeatedly cautions consumers and manufacturers that unclean foam and Food-Service Foam are generally not accepted.

The "Recycling Resources for Consumers" section, which provides a search tool for drop-off recycling locations in the United States, EPS-IA states "you can recycle <u>your EPS packaging</u> by

[55] Sexton Report at 29.

[56] Sexton Report at 18.

[57] DSM Report at 6

[58] Copies of the information obtained from these websites (Exhibit L).

taking it to a specified drop-off location." It continues, emphasizing that "the majority of EPS recycling locations listed are intended to serve as outlets for EPS packaging only." In addition, EPS-IA provides collection guidelines for recycling centers that explicitly exclude egg cartons and Food-Service Foam.[59]

Further, in its manual advising entities how to set up an EPS recycling program, EPS-IA does not mention Food-Service foam; instead, it reiterates the importance of EPS being clean and consistent.[60] The manual walks through the decision making process that an entity should take to determine if an EPS recycling program would be feasible, recommending to "[k]eep handling costs down and increase the value of the EPS by providing clean, contaminant-free material. The quality of the EPS is also important. It must be clean EPS packaging that is not contaminated by food, dirt, tape or paint or glued to cardboard or other plastics." The manual stresses to: "create a system for identifying and eliminating contamination problems. Eliminating contamination is important because materials that can't be recycled may be sent to the landfill. Some recyclers will charge for or return non-recyclable material."

This website demonstrates that the EPS industry's sole focus is on clean packaging recycling, not Food-Service Foam or any source that might be contaminated or variable.

ii. Dart's Website

As part of its research on the recyclability of Food-Service Foam and whether markets exist for this material, DSNY also reviewed Dart's own website. Dart's website identifies 48 businesses "interested in purchasing post-consumer foam # 6." (Post-consumer foam #6 includes single service Food-Service Foam articles.) Dart's website provides general information about each of these 48 companies, like location and contact information as well as the type of foam that each company accepts. Notably, Dart's website does not list the PRI facility as an entity interested in purchasing post-consumer foam.

From the 48 companies identified by Dart as having interest in purchasing post-consumer foam, 39 state that they are only interested in clean foam, which can include packaging foam, colored foam, or clean Food-Service Foam. Eight companies indicated "TBD" regarding the type of material they would accept. Six of these eight companies do not have websites. The other two companies had websites. One company's website indicates that it accepts clean foam in the Madison, Wisconsin area, and it is unclear from the other company's website that it accepts foam at all. Only one company that lists the type of foam it accepts fails to specify that it accepts clean foam only. That company, American Polymer Corp, located in Ohio, does not accept foam from out of state. It also will not pay for any foam it receives. Moreover, on its own website,

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59 http://www.epspackaging.org/index.php?option=com_content&view=article&id=30:collection-guidelines&catid=2:recycling-resources-for-consumers&Itemid=30.

60 http://www.epspackaging.org/images/stories/EPS_Recycling_How-To_Manual-lores.pdf.

American Polymers states that it is a "plastic brokerage firm that specializes in the post-industrial plastic recycling market."

iii. Home For Foam Website

In addition, DSNY reviewed www.homeforfoam.com, a website copyrighted by Dart. This website, which is intended to support the growth of foam recycling, contains a section with a detailed interactive map of Municipal Foam Recycling Programs, both Drop-Offs and Municipal Curbside Collection Programs. This interactive map allows the user of the website to click on a city to find out if the city offers a program to recycle foam, and if so, what type of program the city offers (drop-off or curbside) and what type of material the recycling program collects. DSNY clicked on every icon indicating that a City ran a curbside collection program for Food-Service Foam. Each program indicated that every City offering a curbside collection program for Food-Service Foam only accepts "Clean Food Packaging" into the recycling program.

This research of the EPS industry's own publicly disseminated information confirms that only clean foam is worth the effort to recycle and that markets for Food-Service Foam do not exist.

7. Research on Cities that Collect Foam with Recycling

Jurisdictions Do Collect Foam; the Majority, Though, Fail to Recycle It; and They Are Not Able to Recycle Food-Service Foam At All

Dart submitted an affidavit listing 42 jurisdictions in both the US and Canada that it claims are recycling foam.[61] DSNY investigated the eight biggest jurisdictions, all with populations over 250,000, and found that these jurisdictions were collecting foam but rarely recycling it. None were recycling Food-Service Foam.

DSNY extensively interviewed the eight jurisdictions listed in the affidavit with the largest populations, four located in California and four in Ontario, Canada. Few accepted Food-Service Foam, having learned that it broke apart in sorting or could not be cleaned affordably. Others accepted only Foam Packing Material, which is not the subject of Local Law 142's analysis.

Each jurisdiction's system looked at by DSNY fails test mandated by New York City's Local Law 142. Without exception, each of the eight jurisdictions confirmed through experience that recycling Food-Service Foam is neither environmentally effective nor economically feasible.

Unlike these jurisdictions, New York City has been mandated by its City Council to examine the recyclability of Food-Service Foam before it can require its collection or the collection of any other foam products, like Foam Packing Material.

DSNY heard one consistent message: these jurisdictions regret having designated Foam as a recyclable due to the costs they currently face trying to process Foam, the complete lack of

[61] Moore Affidavit included in Exhibit D.

markets for Food-Service Foam, in particular, and the problems MRFs face sorting foam and its propensity to contaminate other valuable commodity streams, like paper.

i. Jurisdictions in California

a. Los Angeles, California – Foam Take-Out Containers Found Unrecyclable

Los Angeles, the nation's second largest city, currently lists Food-Service Foam as accepted in commingled recycling, but does not sort or market Food-Service Foam because the process is cost prohibitive. Today, Food-Service Foam is disposed of as residue, as nearly all of it is soiled with food residue through consumer use or collection in a commingled recycling stream.

In 2006 and 2007, Los Angeles ran a pilot program to attempt to recover and recycle food-soiled EPS at the urging of a private company that makes simulated-wood moldings out of plastics.[62] Los Angeles provided a mixture of clean and food-soiled EPS material to a MRF that used a technology that could clean, melt, and densify the EPS. The cost to clean and create a block of marketable EPS from both clean and dirty Food-Service Foam was twice as much as the cost for the company to make a virgin plastic. The private company, which initially agreed to purchase the processed densified foam at 4 cents per pound, refused to continue this practice. Unpurchased blocks of post-processed Food-Service Foam accumulated on the MRF floor, producing odors. Ultimately, these blocks were disposed of in a landfill as residue and not recycled. In 2007, Los Angeles abandoned its pilot program and moved forward with processing only completely clean foam.

Today, in Los Angeles's public education materials, it instructs residents to recycle clean foam only, specifically stating that: "All clean polystyrene products (plates, cups, containers, egg cartons, block packaging, and packing materials)."[63] Since Los Angeles only processes clean material, the city carries out a great deal of outreach to residents to discourage them from putting food contaminated EPS in the blue bin.

In a 2013 memo to Los Angeles City Councilman Paul Koretz, Enrique C. Zalidivar, the director of the Los Angeles Bureau of Sanitation noted: "MRFs only recover EPS that is clean and in bulk form because manufacturers and processors of EPS will only purchase post-consumer EPS free of contaminants such as food waste, oil, grease, etc. Contaminated EPS becomes part of the MRFs' residual waste which is disposed of at a local landfill"[64]

[62] Timbron International, Inc.

[63] https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-s/s-lsh-wwd-s-r/s-lsh-wwd-s-r-rybb?_adf.ctrl-state=lzfru3aw5_4&_afrLoop=3805086234336331#!

[64] August 28, 2013 Memo To Los Angeles City Councilman Paul Koretz from Enrique C. Zaldivar, Director, Los Angeles Bureau of Sanitation.

DSNY recently confirmed the accuracy of this 2013 memo through conversations with Los Angeles Department of Sanitation staff. DSNY also recently learned that even Form Packing Materials are failing to be worth the effort. Los Angeles's six processing MRFs sort the foam by hand. Material that gets into the sorter is crushed, breaks apart, and goes to landfill. In the last several months, MRFs processing Los Angeles's recyclables have stopped sorting EPS because the cost for bailing and sorting is too high.

b. Long Beach, California –No Market for Collected Food-Service Foam

Although the City of Long Beach accepts Food-Service Foam in its recycling collection, it struggles to find a market for it. The City of Long Beach instructs residents to recycle "Clean Polystyrene (Styrofoam®)." It notes that this includes foam cups and containers, and foam packaging, such as eggshell cartons, block packing and foam clamshell packaging.

DSNY's conversations with Long Beach's Environmental Services Bureau noted serious challenges with Foam in the recycling stream, particularly in finding an end use for post-consumer Food-Service Foam. The City's MRF informed Long Beach that Food-Service Foam interferes with the MRF sorting process because it breaks up and contaminates other streams, specifically the glass and paper streams. Long Beach has noted that while the recycling program *accepts* all EPS, including Food-Service Foam, the only material not being landfilled is large blocks of Foam Packing Materials.

In Long Beach, the large blocks of Foam Packing Materials are not separated into their own bales, but are combined with mixed rigid bales. These are ultimately exported to Asia. The ultimate fate of Foam Packing Material in exported mixed bales is not known. Officials confirmed that it is entirely possible that Foam Packing is being sorted out and landfilled or incinerated in destination country. There are no local markets for any foam, even Foam Packing Materials, when sorted from commingled collections. For example, a surf board manufacturer in Huntington, California, only uses post-industrial grade foam received straight from manufacturers. They are not interested in the quality of EPS produced in a MRF bale, even Foam Packing Materials.

Recently, Long Beach has been contemplating banning foam. In discussing the possibility of a foam ban, local newspapers report: "City staffers report polystyrene as a 'huge source of litter' that is not easily recycled"[65] and "The foam is not biodegradable, and while technically considered a recyclable material, it rarely finds a second life as a new material because of the high costs associated with cleaning and harvesting it once it's been thrown out."[66]

[65] http://www.gazettes.com/news/long-beach-set-to-ban-styrofoam/article_4eca9d10-c7bb-11e6-ad86-f7452bb5c933.html

[66] http://lbpost.com/news/city/2000010159-styrofoam-ban-set-in-motion-will-include-public-input-before-becoming-law

c. Riverside, California – Sends all Dirty Food-Service Foam to Landfill

The City of Riverside, California lists "Styrofoam" or polystyrene as an acceptable recyclable item, and advises residents to rinse containers before placing in the recycling barrel. At Burrtec, the city's MRF, clean foam, the vast majority of which is Foam Packing Material, is hand-picked from incoming loads. It is then densified and sold to NEPCO, a local buyer.

In conversations with DSNY staff, Riverside officials noted that foam collected at curbside soaks up smells and food contamination. Such material, the majority of all Food-Service Foam received at the MRF, gets treated as residue and is landfilled just like other materials that are soiled with food waste. Most clamshells, for example, are too dirty or contaminated to be recycled and are disposed of as residue. The only foam that the city can consistently recycle and market is clean Foam Packing Materials.

d. Sacramento, California –Landfills its Foam Take-Out Containers

The City of Sacramento instructs residents to recycle "Polystyrene (Styrofoam®) in a clear plastic bag[67]" and place that bag inside the recycling bin with the other loose recycling materials. On its website, it shows only photos of Foam Packing Materials in clear plastic bags.[68] It does not accept Food-Service Foam and does not accept packing peanuts. Interviews with Sacramento revealed that it established this clear-bag separation requirement because Foam Packing Peanuts and Foam Packing Materials were becoming mixed with loads of other recyclables, making the processing of these other materials more costly and complicated.

According to interviews with Sacramento Recycling and Solid Waste Division, Foam Packing Materials collected by Sacramento have absolutely no scrap value. The city preemptively added Foam Packing Materials to the accepted recycling collection list to allow Sacramento to control the collection with the clear-bag rule, reducing the likelihood that the material would mix with other materials in the commingled stream. Clear bags of Foam Packing Materials are sorted by hand from the incoming commingled recycling, densified, and stored until the city amasses enough material to market. Collected EPS is generally marketed once per year and Sacramento indicates that the city has trouble finding a vendor or end market for the collected clean EPS.

MRF Operators for Sacramento have indicated that the cost to separately bale Foam Packing Materials does not equal the value to sell it. Local press coverage indicates that Foam Packing Materials are sent to a landfill rather than being recycled.[69]

ii. Jurisdictions in Ontario, Canada

[67] https://www.cityofsacramento.org/General-Services/RSW/Collection-Services/Recycling

[68] http://www.cityofsacramento.org/public-works/RSW/waste-wizard

[69] http://www.sacbee.com/news/politics-government/article2611349.html

In Ontario, the members of the Canadian Polystyrene Recycling Association (CPRA) attempted for decades to create a subsidized market for expanded polystyrene recycling. However, the industry-funded facility constructed in Mississauga to recycle polystyrene closed in 2008, after the extraordinarily high costs to collect and ship the material made the program unattractive. By that time, several jurisdictions across the province had designated foam for commingled recycling, often under industry pressure. Since the closure of the CPRA facility, these municipalities have failed to find markets for Food-Service Foam from commingled recycling programs, and they have even struggled to market Foam Packing Materials and other clean foam collected in drop-off programs.[70]

a. Toronto, Ontario – Finds no Market for Food-Service Foam, even after approaching re-processors and industry associations in North America.

With a population of 2.6 million people and extensive multi-unit housing, Toronto is perhaps the most comparable city in North America to New York. Its experience follows the experience of other Ontario jurisdictions: heavy industry pressure to add foam to curbside collections, followed by marketing problems after the demise of the Mississauga plant in 2008. Now, faced with a significant cost increase, the City is reviewing its position regarding this material.

Today, Toronto accepts "foam polystyrene (e.g. drinking cups, egg cartons, meat trays, takeout food containers, electronic packaging)" in its blue box commingled recycling collections. Toronto added Food-Service Foam to its curbside recycling collections in in 2008, following a period in 2007 in which Food-Service Foam ban was under policy consideration. Industry pressure led to the designation of foam as a curbside recyclable as an alternative. As discussed above, the facility in Mississauga went bankrupt later that year, leaving the city to find markets for the Food-Service Foam it collected.

Between 2008 and 2016, Toronto paid their customer a high cost per ton to accept Food-Service Foam products. Food-Service Foam has a detrimental effect on MRF operations, including fragmentation and the contamination of other recycling streams. In 2017, the sales contract expired. Subsequent bids resulted in pricing well above what the City considered acceptable as mentioned above.

Currently, the City receives hand-sorted Food-Service Foam and Foam Packing Materials back from the MRF and is actively seeking markets for loose, baled and densified foam abroad. That material is currently being stockpiled as the city seeks a buyer. Of particular note to this determination, Toronto has approached companies and industry associations in the foam business as potential outlets for the city's stockpiled foam, but there has not been any industry interest in taking the material.

Despite this high cost and the contamination of other streams, Toronto is reluctant to remove any designated recyclable from its program, because of the effect on public participation in recycling overall that has been discussed elsewhere in this determination. In the meantime, Toronto is

[70] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

stockpiling the Food-Service Foam it has collected as it seeks to find a company to accept the stored material.

b. Hamilton, Ontario – No Market for Food-Service Foam in Commingled Recycling Collections

Like Sacramento, the City of Hamilton instructs residents to recycle clean foam packaging on its own within a clear plastic bag that can be included with other commingled recyclables. It does not accept loose Food-Service Foam or Foam Packing Materials in its curbside collections. In interviews with DSNY, Hamilton representatives noted that the quantity of foam received in commingled recycling collections is exceedingly small. Large, clean pieces of foam are hand-sorted from incoming commingled recycling. Hamilton staff stress that compaction and commingling render nearly all curbside collection foam unmarketable upon arrival at the MRF, even when residents are instructed to set-out the foam in separate plastic bags.

As an alternative, Hamilton encourages residents to drop off clean Food-Service Foam and Foam Packing Materials at recycling depots. Nearly all foam collected by Hamilton is collected from drop-off sites. This material is stockpiled at the Hamilton MRF, along with the occasional pieces of clean Foam Packing Materials hand-sorted from commingled collection and sent to a Canada Fibers MRF elsewhere in Ontario, where the material is densified. Representatives from Hamilton were not aware of whether the material is marketed to end users.

c. Niagara Region, Ontario, Canada – No Market for Foam Collected From Residents

The Niagara Region of Ontario manually sorts its foam at the MRF. The Niagara Region instructs residents to include "Styrofoam", in their blue box curbside commingled recycling, adding that they should, "[r]emove residue, rinse and place in Blue Box and that if residue cannot be removed, the item should be disposed of as garbage."[71]

In discussions with DSNY, representatives of Niagara Recycling indicated that after the 2008 closure of the industry-funded polystyrene recycling plant in Mississauga the region was no longer able to find buyers for foam collected in commingled recycling. At that time, Niagara Recycling began mixing foam into mixed rigid plastics bales, which were sold to EFS Plastics, an Ontario-based reclaimer. In an interview with DSNY, this reclaimer noted that it sorted and retained valuable polyethylene from these bales but discarded the remainder, including any Food-Service Foam or Foam Packaging Materials contained in the bales.

In 2014, Niagara began experimenting with the INTCO densification technology for manually-sorted foam, and stockpiled the densified material in city-owned property. Niagara staff noted that removing Foam products from the mixed rigid bales has dramatically improved marketability of those bales, indicating that the inclusion of foam had previously reduced the value of that material. INTCO has reneged on its initial offer to buy back Niagara's foam, citing

[71] https://www.niagararegion.ca/waste/disposal/search.aspx?e=1&id=689&q=Styrofoam.

food residue contamination in the densified bricks produced at its MRF. Of significant note to this determination, Niagara representatives have approached PRI but as yet that facility has not been interested in purchasing densified foam produced at the Niagara MRF. At present all foam is being stored until a customer can be found.

d. Peel, Ontario – Foam Contaminates Other Commodities and MRF Cannot Market Foam

Contemplating a ban on foam products, Peel, Ontario instead designated foam as recyclable when presented with a subsidized recycling option by the CPRA. After it designated foam as a recyclable, the industry-run facility closed, leaving Peel to try to handle the material in its existing MRF. Peel reports that it must hand-sort the material, and it ends up being landfilled.

Peel accepts foam egg cartons, foam coffee cups, meat trays, and blocks or sheets of Foam Packing Materials in the curbside collection program. Peels's MRF has noted problems with processing foam. The material gets broken up in the collection trucks and by the time it reaches the MRF, the foam products have broken into tiny pieces that fly throughout the MRF like fluff. Foam products are manually sorted from incoming commingled recycling, but foam that makes it past the hand sort often gets caught in the two-dimensional sorter and ends up mixed in with paper. Some foam makes it to the three-dimensional sorter and ends up with mixed plastics.

Since the industry-subsidized facility went out of business, Peel's contracted MRF does not hand-sort for foam or create a separate bale of foam material. Any foam collected as part of the recycling program goes straight to residue and is landfilled. Peel's contract with the MRF specifies target recovery rates for every material and a penalty if the MRF misses the target. However, when it comes to foam, the MRF simply pays the penalty amount because there are no markets for the collected material.

e. Other Ontario Cities Shutting Down Foam Recycling Programs Due to Market Problems

Recently, two cities in Ontario have taken the step of un-designating foam as a recyclable material. In doing so, these cities noted the nonexistence of markets for collected foam material. The city of Owen Sound ended its drop off recycling program for polystyrene foam products including foam clamshell takeout containers and cups due to a lack of demand for the post-consumer products, noting "it's such a marginal material that we haven't been able to find a market for it."[72]

Meanwhile, the city of Peterborough has discontinued the recycling of Styrofoam materials and has asked residents to stop placing the material in their blue [recycling] containers, noting on its website: "Styrofoam is very light and bulky, making it difficult and expensive to ship and process. Costs have continued to escalate over time and markets have virtually disappeared.

[72] https://www.rco.on.ca/announcements/pub:283/Styrofoam-recycling-to-end-in-Owen-Sound.

Consequently, it is simply not feasible to continue collecting, sorting, and processing this material under these conditions."[73]

iii. Large Cities Do Not Designate Foam as Recyclable - Those That Do Collect, Do Not Recycle the Material.

As part of NRDC's February 2016 submission to DSNY, NRDC included an affidavit from Zac Randell, who researched the 28 largest cities in the United States by population to determine if foam was designated as a recyclable material. Randell concluded that of the twenty eight largest cities in America, only three cities designate foam as recyclable: Los Angeles, CA, San Antonio, TX and Jacksonville, FL. [74]

Randell noted that San Antonio designates foam as recyclable, but that he spoke with a representative from San Antonio's Solid Waste Management Department who told him that "food contaminated polystyrene, as well as solid blocks of polystyrene, are not accepted or recycled in the city's program." He further noted that while foam is a designated recyclable material in Jacksonville, FL, he spoke with an employee from Jacksonville's Solid Waste Division who stated "there is no local market for polystyrene recycling and that the only reason polystyrene is accepted by the city is because of statewide recycling acceptance goals that the city must meet."[75] In fact, the City of Jacksonville's website now states that all types of Styrofoam (polystyrene) are not accepted for recycling.[76] Randell thus concluded that "none of the nation's largest cities has a successful program for recycling polystyrene foam food and beverage containers.

Indeed, as NRDC has previously documented, many major cities—including San Francisco, Oakland, San Jose, Minneapolis, and Portland, Maine—have banned Food-Service Foam, explicitly finding that this material is not feasibly recyclable.[77]

8. Foam Contaminates Organics and is the Leading Plastic Pollutant in New York Harbor

New York City's Organics Program currently serves 1.2 million residents and is on track to expand through curbside collection and drop-off locations to the entire city by the end of 2018. WeCare, a long-term contractor of DSNY's composting operations reports that "one of the

[73] http://www.peterborough.ca/News/Styrofoam_Recycling_Ends_January_1__2016.htm?DateTime=635872032000000000&PageMode=View.

[74] Randell notes that he did not conduct research into Los Angeles' polystyrene recycling program because he understood that such program was being discussed in the Sexton report.

[75] Randell affidavit, included in Exhibit D at 6.

[76] http://www.coj.net/departments/public-works/solid-waste/recycling/curbside-recycling

[77] Affirmation of Eric Goldstein, dated June 26, 2015, ¶ 21.

contaminants most often found when recycling food waste is polystyrene foam due to its use in many restaurants, convenience stores, and households."[78] WeCare reports that because Food-Service Foam breaks so easily into very small pieces, it creates significant, unique challenges for composters to remove "even with advanced mechanical equipment."

Staff of Long Beach's Environmental Services Bureau cited the Los Angeles and San Gabriel River Watersheds 2014 litter study as a potential catalyst for that city to reverse its decision to collect Food-Service Foam as a recyclable. The study, issued well after Long Beach and other area municipalities had designated foam as recyclable, recommends a ban "on single-use" "polystyrene containers (e.g., Styrofoam),"[79] and lists foam in the top four most common pieces of litter. The study also highlighted that 50% of the litter found as part of the study was single-use food packaging, including Food-Service Foam.[80]

After DSNY's initial determination on the recyclability of Food-Service Foam, The NY/NJ Baykeeper issued its February 2016 Plastic Collection Report, the first analysis of plastics in the NY-NJ Harbor Estuary. The 2016 Report concludes that there are "165 million plastic particles are floating within NY-NJ Harbor Estuary waters at any given time." Of these plastic particles, the Plastic Collection Report states that "the most abundant type of plastic present in the samples was foam (38%)."[81] The Report emphasizes that plastics soak up toxins in the water and are often ingested by marine life. Calling the amount of plastics found in the harbor estuary "startling," the Report concludes based on its sampling that "New York City has a serious single-use plastic pollution problem."[82]

[78] Letter from WeCare Organics LLC, March 18, 2013.

[79] *Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds Project Brief*, Algalita Marine Research Institute, at 4; http://www.algalita.org/reducing-plastic-debris-los-angeles-san-gabriel-river-watersheds/.

[80] *Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds Project Brief*, Algalita Marine Research Institute, at 2-3; http://www.algalita.org/reducing-plastic-debris-los-angeles-san-gabriel-river-watersheds/

[81] NY/NJ Harbor Estuary Plastic Collection Report, NY/NJ Baykeeper, Feb. 2016 at 6.

[82] NY/NJ Harbor Estuary Plastic Collection Report, NY/NJ Baykeeper, Feb. 2016 at 16.

E. ANALYSIS

For 30 years, attempts to recycle Food-Service Foam—both subsidized and non-subsidized attempts—have failed at each step in the recycling process. [83] The municipalities researched by DSNY tell this exact story: Food-Service Foam is not capable of being recycled in an environmentally effective or an economically feasible manner.

The municipalities found that Food-Service Foam compacts in collection trucks, breaks into bits, and becomes covered in food residue, making it worthless when it arrives at the MRF. [84] It then blows throughout the MRF,[85] is missed by manual sorters, mistakenly moves with the paper material and contaminates other valuable recycling streams, namely paper,[86] which can be the most consistently valuable commodity in a recycling program. Food-Service Foam is too costly to clean and process compared to virgin material.[87] If some is sorted successfully, the light-weight foam must be stored for months, waiting for enough material to economically ship.[88]

If any Food-Service Foam makes it over these hurdles, the process grinds to a stop due to the struggle to find a buyer. With no buyer, municipalities get stuck and ultimately send the remaining amount of Food-Service Foam that escaped being landfilled after the compacting stage or after the sorting stage to a landfill.

This has been the experience of the largest municipalities researched by DSNY—the same municipalities that Dart suggested DSNY research—and several other small and large municipalities that also attempted to recycle Food-Service Foam. After designating Food-Service Foam, numerous municipalities end up sending the material to a landfill at each step in the recycling process.

There is no basis to expect that New York City's experience will be any different. New York City has the same commingled collection, the same compaction trucks, and the same optical sorting machines that failed in tests reported by Plastic Partners in which only 7 percent of the Food-Service Foam was found to reach the targeted bale. In fact, New York City's own attempt to sort at Sims South Brooklyn Facility resulted in approximately half of the Food-Service Foam failing to sort accurately even when run at a slower, more favorable speed than normal operations. DSNY, its plastic industry consultant, and Sims all agreed that the recovery rate

[83] Schedler Report.

[84] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[85] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[86] Plastic Partners at ; Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[87] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[88] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

would be appreciably lower if the belts were run at full speed, as opposed to the one-third speed used during the City's test. This low recovery will further decrease when New York City moves to a single-stream recycling program in less than five years, as the Plastic Partners' study found.

New York City would then face the same market forces that reject Food-Service Foam as a recyclable that Los Angeles, Toronto, Long Beach, Sacramento, Peel, and Hamilton have all encountered. It would find exactly what DSNY's expert economist did that "[g]iven the lack of demand for recycled post-consumer EPS and the high costs of converting dirty EPS into a marketable product, there is no evidence of a market for this material." Sexton found no reclaimers willing to buy Food-Service Foam, but instead many who called it "garbage," commenting that it is sent straight to landfills. DSNY's research on markets for collected Food-Service Foam found that the industry does not promote Food-Service Foam recycling and that there is no market for the material. All curbside collection programs in North America are focused solely on clean foam according to the industry's own websites.

A subsidized program is not a market. Subsidy offers to other municipalities disappeared with a foam-industry-sponsored processing facility closing in Ontario.[89] Los Angeles found a buyer that later refused to purchase the Food-Service Foam that the city had sorted, cleaned, melted and densified.[90] With no markets for the material, these municipalities were left, scrambling to find a processor, paying higher fees for processors, landfilling the foam, or storing the foam until it figured out a solution. These are the unwanted consequences that New York City must expect based on other jurisdiction's experiences. The small and marginally viable market that exists is for Foam Packing Materials, not a part of the analysis mandated by Local Law 142.

Finally, several jurisdictions that designated foam, some incentivized by a subsidized program and some not, plan to reverse their designation of foam as a recyclable or are considering it, citing high costs, contamination issues, shipping inefficiencies, the vanished market, and the fact that foam dominates the plastic litter found in surrounding waters.

The municipalities considering de-designating foam as a recyclable spoke of the problem of doing so since it impacts the public's confidence that recycling, on the whole, is working. New York City experienced this when it temporarily reversed its designation of glass and plastic in 2002. The consequence was a significant reduction in the overall recycling rate, which took over 15 years to recover. New York City does not want to relive that unfortunate impact to its recycling program again.

1. The Mandate of Local Law 142

Local Law 142 mandates an analysis: can Food-Service Foam be recycled at Sims' South Brooklyn Marine Terminal location in a manner that is environmentally effective, economically feasible, and safe for employees. Having found that Food-Service Foam can be recycled in a

[89] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[90] Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

manner that is safe for employees, this analysis discusses its environmental effectiveness and its economic feasibility.

i. Environmentally Effective

Local Law 142 breaks "environmentally effective" into several components.

→ Environmentally Effective "means not having negative environmental consequences."

→ Negative environmental consequences include, but are not limited to, having "the capability to be recycled into new and marketable products without a significant amount of material accepted for recycling being delivered to landfills."[91]

ii. Economically Feasible

Similarly, Local Law 142 breaks "economically feasible" into several components.

→ Economically feasible "means cost-effective."

→ Cost-effective includes factors like "direct and avoided costs."

→ Cost-effective must include "consideration of markets for the recycled materials"[92]

2. Food-Service Foam is Being Landfilled by the Jurisdictions Collecting It

Local Law 142 prohibits a finding of environmental effectiveness if "a significant amount of the material accepted for recycling" is "being delivered to landfills."[93] DSNY's research and discussions with jurisdictions that collect foam as part of their residential recycling truck collection lead to one conclusion—Food-Service Foam is being landfilled due to high costs and issues in dealing with dirty Food-Service Foam, significant crushing in collections, failures with sorting, and the lack of any market specifically for Food-Service Foam.[94] The difficulty with sorting Food-Service Foam was found in outside tests and in DSNY's test at Sims. Sorting machines failed in tests reported by Plastic Partners with only 7 percent of the Food-Service Foam reaching the targeted bale. New York City's test at Sims failed to sort accurately even when run at slower than normal speeds. Food-Service Foam is being collected as a "designated recyclable," but after designating it, numerous municipalities end up sending the material to a landfill at each step in the recycling process. Based on the difficulties associated with Food-

[91] LL 142 of 2013

[92] LL 142 of 2013

[93] LL 142 of 2013.

[94] See Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

Service Foam at each of these required steps in the recycling process, Food-Service Foam cannot be recycled in an environmentally effective manner.

3. No Markets Exist for Recycled Food-Service Foam, Failing Economic Feasibility and Environmental Effectiveness

To be cost-effective and substantiate a finding of economic feasibility under Local Law 142, DSNY must consider "markets for the recycled material." The viability of the market is also a component of the environmentally effective analysis in that Food-Service Foam must have the "capability of being recycled into new and marketable products" without any negative environmental consequences.

Municipalities in the United States and Canada [95] have struggled to sort Food-Service Foam and then struggled to find any buyer for it. Each municipality emphasized their conclusion that there is no market at all for Food-Service Foam.

This finding is echoed by Behr and Sexton. Again, Behr concluded that "[g]iven the lack of demand for recycled post-consumer EPS and the high costs of converting dirty EPS into a marketable product, there is no evidence of a market for this material." After investigations into 137 companies identified by Dart and BRG, the Sexton Report found "no evidence of a sustainable market for [Food-Service Foam] now or in the near future."[96]

Food-Service Foam is not being purchased by reclaimers. Businesses that are using EPS are only interested in purchasing industrial discards or clean post-consumer Foam Packing Materials. The EPS industry itself is not supporting or promoting the recycling of Food-Service Foam. Instead, according to the industry's own disseminated information, all foam collections programs in North America are focused on the collection of clean Foam Packing Materials.

As such, Food-Service Foam has no viable market and it is not being made into new and marketable products, failing both the economically feasible and the environmentally effective tests under the law's mandate.

4. Processing Food-Service Foam Not Cost-Effective

Local Law 142 prohibits a finding of economic feasibility if the process is not "cost-effective." Los Angeles abandoned its attempts to clean, process, and convert Food-Service Foam into a new marketable product because it was twice the price of using virgin material. Peterborough reversed its designation of recyclability due to costs and lack of markets. Both Behr and Schedler conclude the high costs of converting dirty Food-Service Foam into a usable feedstock make it

[95] See Section 7 of this determination: Research on Cities that Collect Foam with Recycling, discussions of Los Angeles, CA, Long Beach, CA, Riverside, CA, Sacramento, CA Toronto, Toronto, Ontario, Hamilton, Ontario, Niagara Region, Ontario and Peel, Ontario.

[96] Sexton Report, at 4.

an unmarketable item. Due to the high costs, attempts to recycle Food-Service Foam are not economically feasible.

5. Food-Service Foam Contaminates Valuable Recycling Streams

Local Law 142 prohibits a finding of environmental effectiveness if the designation has "negative environmental consequences." Research and discussions with municipalities and MRFs echoed the story found by the seeded-test sorting runs in the Plastic Partners Report—Food-Service Foam contaminates other valuable recycling streams, like paper.[97] This is a potential negative environmental consequence of collecting, compacting, and running Food-Service Foam through New York City's processing system. Diminishing the viability of the existing recycling streams is a significant concern to New York City and a potential negative environmental consequence, making Food-Service Foam recycling not viable. Moreover, the continued use of Food-Service Foam in New York City leads to contamination in the City's organics collection program that is "very challenging for composters to remove, even with advanced mechanical equipment."[98]

6. If New York City designates Food-Service Foam Recyclable, Then Abandons, It Will Reduce the Overall Recycling Rate

Another potential negative environmental consequence is a reduction in the City's overall recycling rates if New York City designates Food-Service Foam as a recyclable and then five years from now, removes it from the stream, declaring to the public that it is no longer viable without Dart's offer to Sims. The research also shows that industry-sponsored foam recycling programs have failed over the last 30 years in the US and in Canada, leaving cities facing huge costs and no buyers. After the subsidized markets failed in Ontario, Canada, many municipalities have paid MRFs to sort the designated Food-Service Foam and then landfilled it. Others have reversed foam's designation as a recyclable, like Peterborough and Owen Sound. Or they have considered reversing their designation due to the lack of buyers. The City's recycling rates significantly dropped when New York City altered its recycling requirements temporarily in 2002. This is a negative environmental consequence that the City does not want to experience again.

[97] Plastic Partners at 54 and 58 and Section 7 of this determination: Research on Cities that Collect Foam with Recycling.

[98] Letter from WeCare Organics LLC, March 18, 2013.

F. CONCLUSION

DSNY concludes that Food-Service Foam in not capable of being recycled at the designated recycling processing at the South Brooklyn Marine Terminal in a manner that is environmentally effective or economically feasible.

As a result of this determination, on and after November 13, 2017, no food service establishment, mobile food commissary, or store shall possess, sell, or offer for use single-service articles that consist of expanded polystyrene ("Food-Service Foam"), unless otherwise exempt under Local Law 142. In addition, no manufacturer or store shall sell or offer for sale polystyrene loose fill packaging ("Foam Packing Peanuts"). In accordance with Local Law 142, DSNY will provide public education and outreach to food service establishments, mobile food commissaries, and stores to inform them of the provisions of this section and provide assistance with identifying replacement material and no violations will be issued under this Law until May 14, 2018.