Forensic Evaluation of Non-Dispersables

New York City Law Department
New York, NY

August 15th 2016

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Manchester, CT 06040

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FUSS & O'NEILL

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1. Archived Recovered Items (Under Separate Cover)

1 Introduction

Fuss & O'Neill Engineers, Inc. (Fuss & O'Neill), with headquarters in Manchester, Connecticut, performed the scope of work described in this Report under Agreement with the New York City Law Department (the Department). The Agreement for Sanitary Sewer Forensic Consulting Services, effective September 1, 2015, is described as follows in Department files:

- Matter #2014-0316398L
- PIN 02516X000762
- E-PIN 02516N0011001

Fuss & O'Neill staff members involved in the work described in this Report include Mr. Virgil Lloyd, Ms. Aubrey Strause, Mr. Daniel Iannicelli, and Ms. Tenzin Lama.

- Mr. Lloyd is a Senior Vice President and partner with Fuss & O'Neill, with over 37 years of experience in wastewater systems engineering, serving municipalities, state agencies and private clients. He is a registered Professional Engineer in Connecticut, Rhode Island, Massachusetts, New Hampshire and Maine. He holds a Master's Degree in Environmental Engineering from the University of New Haven and a BS degree in Civil Engineering from the University of Connecticut. He is a longtime member of the New England Water Environment Association (NEWEA), where he is currently the Council Director of the Collection Systems & Water Resources Council, providing liaison and guidance for eight technical committees in the collection systems and water resources fields. He is a member of the Board of Directors of the Connecticut Water Pollution Abatement Association (CWPAA), where he is responsible for development and coordination of training programs. He is currently the co-chair of the Connecticut PA12-155 Phosphorus Non-Point Source Workgroup. He is also a member of the Water Environment Federation (WEF) and the American Public Works Association (APWA). He serves as Principal on this project and provided technical review of this report.

- Ms. Strause is an Associate with Fuss & O'Neill and the owner of the consulting firm Verdant Water, PLLC. She is recognized nationally for her work since 2009 to reduce the burden of non-dispersible wipes in sewer systems, with both the Maine Water Environment Association and Verdant Water. She has two BS degrees in Bioresource Engineering from Rutgers University (1998), and is a licensed Professional Engineer in New Hampshire, Massachusetts, and Maine. Ms. Strause is a member of NEWEA, WEF, the National Association of Clean Water Agencies (NACWA), and APWA. She is the author of many articles about the impact disposal of non-dispersible items has, and was the team leader for the Maine Water Environment Association's "Save Your Pipes: Don't Flush Baby Wipes" campaign, implemented jointly with the Association of the Nonwoven Fabrics Industry (INDA). She has been maintaining a reference database of nonwoven fabrics since 2009 and copyrighted this resource through Verdant Water in 2015. She served as technical lead, field leader, and primary author of this report.

- Mr. Iannicelli is a Project Engineer in the Wastewater Department of Fuss & O'Neill. He is primarily involved with the planning, design, and construction oversight of water and

wastewater projects. He provided assistance during the field operations described in this report, as he has done on a similar forensics evaluation.

- Ms. Lama was an Environmental Engineer (Engineer) with Fuss & O'Neill. She separated from the firm shortly after this forensic event was completed. She provided assistance during the field operations described in this report.

Fuss & O'Neill staff members were compensated at the rates shown in *Table 1*.

Table 1
Fuss & O'Neill Compensation Schedule

Billing Category	Hourly Rate
Engineer, Scientist, Analyst I (Ms. Lama)	$117
Engineer, Scientist, Analyst II (Mr. Iannicelli)	$127
Associate (Ms. Strause)	$227
Senior Officer (Mr. Lloyd)	$247

2 Overview of the Forensic Evaluation

The New York City Department of Environmental Protection's (NYC DEP's) Wards Island Wastewater Treatment Facility is located on Wards Island in the East River (between Manhattan and the Astoria section of Queens). Fuss & O'Neill met in the Administration Building of the facility with NYC DEP Division Chief of Operations, Jerry Fragias, and NYC DEP Wards Island Process Engineer Yu-Tung Chan on the afternoon of Tuesday, February 16.
The facility has a design capacity to provide full treatment of 275 million gallons of wastewater per day (MGD) and is presently required to maintain the ability to pump 320 MGD, per Mr. Chan. Although the facility is required to maintain a pump capacity of 320 MGD, some storm events cause the plant to reach over 400+ MGD. We understand that this facility is continuously struggling to manage the increasing volumes of non-dispersible materials present in influent. These materials cause operational challenges at points in the treatment process from headworks (screening and material disposal) through secondary treatment (interfering with valves and blocking channels) and sludge management (pump clogging).

The purpose of this forensic evaluation was to identify the materials present in a "snapshot" of influent to this facility from a combined system (i.e., both sanitary sewer and storm drain flows). The "snapshot" would compare items entering the facility through two separate channels: one conveying flow from Manhattan, and one conveying flow from the Bronx.

The Manhattan channel and the Bronx channel are each served by three functional mechanical screens (a fourth screen at each of the two locations is presently being replaced). The screens use automatic raking mechanisms to scrape debris from evenly spaced bars and deposit the debris into dumpsters, which are emptied manually. The Fuss & O'Neill team had the opportunity to visit the screening system associated with the Bronx channel the afternoon of Tuesday, February 16, but did not see the Manhattan facility. This process is nearly continuous: one dumpster is nearly full in the short time it's taken the operator to empty the other two dumpsters.

3 Sample Collection

At approximately 7:30 AM on Wednesday, February 17, 2016, NYC DEP Wards Island staff collected materials from each of the two channels, filling one five-gallon bucket with material from the three operating screens serving the Bronx channel and another five-gallon bucket with material from the three operating screens serving the Manhattan channel.

A storm event delivered 0.44 inch of rain on February 15 and another 1.01 inches of rain during an intense storm on February 16, the day Fuss & O'Neill arrived on site. This precipitation was measured at station KNYC (Central Park, New York), which is located approximately two miles from the Wards Island facility (Weather Underground; www.wunderground.com/history/airport/KNYC/2016/2/16/DailyHistory.html et al).

Flows at the time of collection on February 17 were approximately 146 MGD through the Bronx channel and 79 MGD through the Manhattan channel, with a total of 225 MGD entering the Wards Island treatment facility.

One week earlier, on February 10, 2016, flows at the same time of day (7:30 AM) at these locations were 136 MGD through the Bronx channel and 73 MGD through the Manhattan channel, with a total of 209 MGD entering the Wards Island facility. On February 8 and 9, 0.05 and "trace" inch of precipitation were recorded, respectively, more closely representing a dry weather scenario. Flows during the sample collection period were approximately 7.3% higher than flows the previous week as the system responded to the February 15/16 storm event.

All data related to facility flows were provided by Mr. Chan.

4 Preparing the Wards Island Evaluation Location

NYC DEP Wards Island operators delivered two five-gallon buckets, one from each the Bronx and Manhattan channels, to the garage of the Sharon Heat Exchanger building shortly after the samples were collected on Wednesday, February 17, 2016.

The Fuss & O'Neill team met with Marcus Entenza, NYC DEP Wards Island Health and Safety Officer, in the morning for a site-specific safety orientation, which augmented the Job Hazard Analysis that Fuss & O'Neill staff had prepared in advance. Mr. Entenza, Mr. Fragias, and NYC DEP Wards Island Deputy Plant Chief Malak Shafik would serve as on-site contact people for Fuss & O'Neill staff for the duration of the project. Cell phone numbers for all Fuss & O'Neill staff were provided to NYC DEP Wards Island staff.

After the NYC DEP safety orientation, Fuss & O'Neill staff mobilized to the Sharon Heat Exchanger building garage, where sorting, evaluation, and archiving activities would be performed. Substantial personal protective equipment (PPE) were utilized during the forensic evaluation to mitigate or eliminate exposure to biological, physical, and chemical hazards.

The Fuss & O'Neill team prepared floor and elevated work areas in the Sharon Heat Exchanger building garage at which to sort the materials that had been collected by NYC DEP staff, as well as areas to archive materials once they were identified.

All critical activities performed by Fuss & O'Neill (including sorting, identification, archiving, and documentation of recovered items) were recorded using a SONY Handycam (model DCR-SX45). All videos have been provided on a portable WD "My Passport" Ultra hard drive. See *Appendix C*.

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5 Objective and Methodology

5.1 Objective

As stated previously, the general objective of this forensic evaluation was to identify the materials present in a "snapshot" of influent to this facility from two service areas.

The evaluation was specifically designed to gather information on the quantity and variety of consumer products made from a variety of nonwoven fabrics. These items, commonly referred to as wipes, fall into a number of consumer product categories and are marketed in different ways, including "flushable", "disposable", and "biodegradable".

Limited studies of the wipes recovered in influent have been completed to quantify the exact wipe product(s) found in sewage. As a result, many media reports and complaints commonly refer to them as "flushable" due to the disposal method, whether they are marketed as such or not.

The objective of this evaluation was to determine, to the maximum extent possible, what specific wipes were recovered, including the brand.

5.2 Methodology

The methodologies used by Fuss & O'Neill to sort, identify, and archive recovered wipes are consistent with those described in the Draft "*Methodology for Forensics of Products in Wastewater*" (the Methodology), a standard operating procedure (SOP) being developed by Ms. Strause for the National Association of Clean Water Agencies (NACWA). *(Note: This document is due to be published in early 2017- the title and contents are subject to change. This document will be made available by NACWA when it has been finalized.)*

The approach defined in the Methodology uses characteristics of the recovered wipe, including the following general observations:

1. Dimensions (length and width)
2. General ratio of length to width
3. Presence of an embossed pattern on one or more side of the wipe
4. Presence of pinking (i.e., a zigzag edge)
5. Presence of raised lines (i.e., ribs) on one or more side of the wipe
6. Consistency of ribs (i.e., parallel and evenly spaced vs. variable spacing)
7. Uniformity of ribs (i.e., of equal thickness vs. variable thickness)
8. Orientation of ribs (i.e., crossing the product in its direction of length vs. direction of width)
9. Difference in ribs on the two sides of wipe
10. Location and number of folds on the wipe
11. Absence of folds on the wipe
12. Perforated edges of the wipe, indicating delivery in cylindrical canister
13. Orientation of fibers (i.e, parallel or random)

14. Length of fibers, and uniformity and consistency in fiber length
15. Presence of apparent synthetic fibers
16. Opacity when backlit, reflecting the thickness of the wipe
17. Consistency of density of fiber web when backlit
18. Consistency of density of fiber web when placed on a dark surface
19. Texture of wipe as it dried

Fuss & O'Neill staff used observations about these characteristics in conjunction with the reference samples maintained by Ms. Strause. Reference samples of more than 200 wipes, in a wide variety of product categories were available during this evaluation in two formats:

1. Laminated in clear plastic, allowing the Fuss & O'Neill team to observe the characteristics.
2. Loose samples in small zippered plastic bags, allowing the team to supplement observations by handling a clean sample of the wipe, and comparing the tear strength of the reference sample to a recovered item.

A numbering, organizational, and labeling system used by Ms. Strause allowed staff to quickly find the loose reference sample matching the laminated reference sample.

This reference sample set is copyrighted by Ms. Strause. (as Verdant Water, PLLC) It was used by Fuss & O'Neill with permission for this project. It will not be provided to the New York City Law Department.

6 Evaluating Recovered Samples

6.1 Forensics of Materials Recovered from the Bronx Channel

Fuss & O'Neill began the evaluation of materials recovered from the Bronx Channel at approximately 10:00 AM on Wednesday, February 17. The evaluation process continued all day and consisted of separating various items from the five-gallon bucket provided by Wards Island staff.

Assessment of the samples included the following steps:

- Separation of trash from possible wipes materials.
- Detailed visual separation of remaining materials into various piles including paper towels, flushable wipes, baby wipes, surface cleaning wipes, feminine hygiene products, hygiene wipes, other wipes, bath/medical wipes, mechanic/shop towels.
- Brand identification of various wipes from each category.
- Archiving brand identified wipes for future reference.

Mr. Iannicelli and Ms. Lama performed the initial sort of recovered items larger than 1-inch square, placing easily identifiable products into piles, by category. Items considered trash were counted but not identified. Materials identified as paper towels were placed into piles of roughly equivalent size; these were not identified by brand. Woven mats consisting of primarily hair were counted as trash. All non-wipe items recovered were disposed of after being counted.

Materials that were not immediately identifiable or that were very small were placed in a separate location for evaluation by Ms. Strause.

All members of the team assigned unique identification numbers to each item as it was archived or identified, working from a sheet of pre-printed labels to avoid duplication. The identification number format was "WI-BX-###", where:

- WI indicates Wards Island,
- BX indicates the Bronx Channel, and
- ### is the unique number of the item recovered from the Bronx Channel sort.

Products were archived as they were identified. Items confirmed to be wipes but that could not be identified by brand were also archived. At least one of each unique item was archived via non-thermal lamination, with duplicates of that item placed in zippered plastic bags, due to a finite number of lamination sleeves on site (see *Section 8* for materials and methods). Recovered items that were determined to be wipes but that were highly deformed (i.e., stretched to a length that exceeded the size of the lamination sleeve, or twisted into a rope that could not be laminated) were also placed in zippered plastic bags.

Ms. Strause identified materials that were unidentified by the initial sort, using the reference samples as a resource.

Ms. Lama and Mr. Iannicelli archived recovered items and photographed items that had been archived.

Some items recovered from the Bronx sort were not identified before the team left the site the evening of Wednesday, February 17. These materials were placed in a separate part of the work area, and Ms. Strause resumed evaluating these the morning of Thursday, February 18.

6.2 Forensics of Materials Recovered from the Manhattan Channel

Mr. Iannicelli and Ms. Lama began the evaluation of materials recovered from the Manhattan Channel at approximately 9:00 AM on Thursday, February 18.

Mr. Iannicelli performed the initial sort of recovered items, placing easily identifiable products into piles, by category. The same rules for categorization used in the sort of materials from the Bronx Channel were followed for the materials from the Manhattan Channel.

Materials that were not immediately identifiable were placed in a separate location for evaluation by Ms. Strause.

All members of the team assigned unique identification numbers to each item as it was archived or identified, working from a sheet of pre-printed labels to avoid duplication. The identification number format was "WI-M-###", where:

- WI indicates Wards Island,
- M indicates the Manhattan Channel, and
- ### is the unique number of the item recovered from the Manhattan Channel sort.

Ms. Lama archived recovered items and photographed materials that had been archived.

Ms. Strause identified materials that were unidentified by the initial sort, using the reference samples as a resource.

The process continued until 7:00 PM, when the Fuss & O'Neill team had to demobilize. At this time, the Fuss & O'Neill team placed all items from both the Bronx and Manhattan sorts that had been archived into a box and sealed it with packing tape and a custody seal. Custody of this box was formally transferred to the operator on duty in the process building, with instructions to keep it in a refrigerated area. Wipes recovered from the Manhattan channel that were not identified on Thursday, February 18 were separated by layers of clean paper towel and placed into three large zippered plastic bags. Ms. Strause kept custody of these items and later performed identification of them back in Maine at another facility. These items were kept refrigerated until Ms. Strause performed the identification.

7 Identifying Recovered Items

7.1 Summary of Bronx Channel Sort

Figure 1 shows the breakdown of all materials recovered from the Bronx Channel Sort on February 17, 2016. The breakdown primarily shows the majority of items as Paper Towels, Baby Wipes, and Trash. 77% of all sorted items included these three categories. *Table 2* shows the count and percentage breakdown of all materials recovered.

Figure 1 - All Materials Recovered
Wards Island - Bronx Sort - Feb 17, 2016

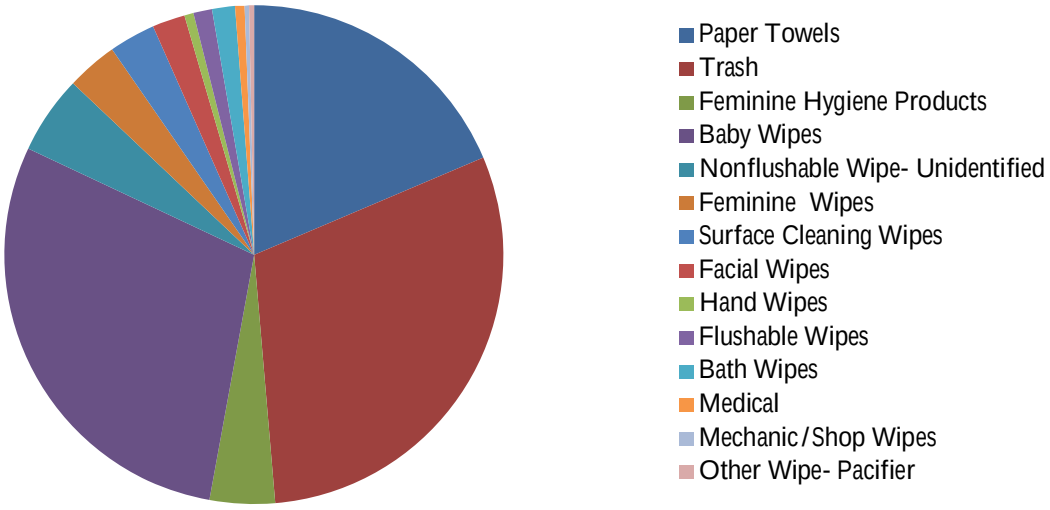

Figure 2 shows the breakdown of wipe materials recovered from the Bronx Channel Sort on February 17, 2016. This breakdown does not include trash or paper towels. 62% of wipe materials recovered were various brands of Baby Wipes. *Table 3* shows the count and percentage breakdown of wipe materials recovered. *Appendix A* shows an overview of specific brands of each type of wipe found during the sort of items recovered from the Bronx channel.

Table 2:
All Materials Recovered – Bronx Channel Sort

All Materials Recovered	Count	%
Trash	100	30.0%
Baby Wipes	97	29.1%
Paper Towels	62	18.6%
Nonflushable Wipe	17	5.1%
Feminine Hygiene Products	14	4.2%
Feminine Wipes	11	3.3%
Surface Cleaning Wipes	10	3.0%
Facial Wipes	7	2.1%
Bath Wipes	5	1.5%
Flushable Wipes	4	1.2%
Hand Wipes	2	0.6%
Medical	2	0.6%
Mechanic/Shop Wipes	1	0.3%
Other Wipe- Pacifier	1	0.3%
Totals	333	100.0%

Figure 2 - Breakdown of Wipes Recovered
Wards Island - Bronx Sort - Feb 17, 2016

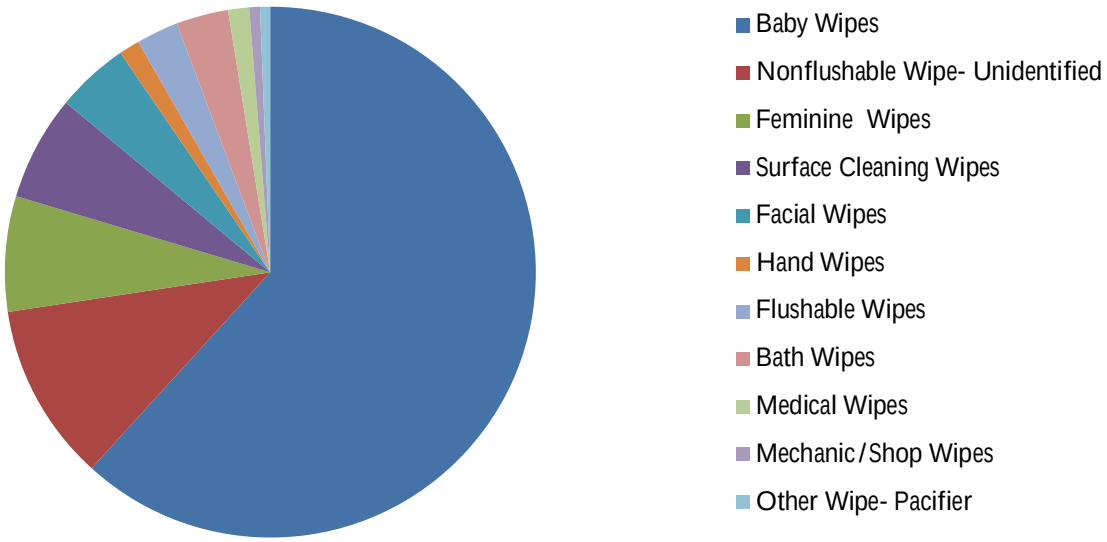

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Table 3

Breakdown of Wipes Recovered – Bronx Channel Sort

Wipe Materials Recovered	Count	%
Baby Wipes	97	61.8%
Nonflushable Wipe	17	10.8%
Feminine Wipes	11	7.0%
Surface Cleaning Wipes	10	6.4%
Facial Wipes	7	4.5%
Hand Wipes	2	1.3%
Flushable Wipes	4	2.5%
Bath Wipes	5	3.2%
Medical Wipes	2	1.3%
Mechanic/Shop Wipes	1	0.6%
Other Wipe - Pacifier	1	0.6%
Totals	157	100.0%

For the Bronx sample, a summary of recovered wipes is as follows:

Wipes Identified by Brand=	126
Total Wipes Recovered=	157
% Identified=	80.3%
# of Unique Category/Brands Identified=	33

7.2 Summary of Manhattan Channel Sort

Figure 3 shows the breakdown of all materials recovered from the Manhattan Channel Sort on February 18, 2016. The breakdown primarily shows the majority of items as Paper Towels, Baby Wipes, and Trash. 80% of all sorted items included these three categories. *Table 4* shows the count and percentage breakdown of all materials recovered.

Figure 3
All Materials Recovered
Wards Island - Manhattan Sort - Feb 17, 2016

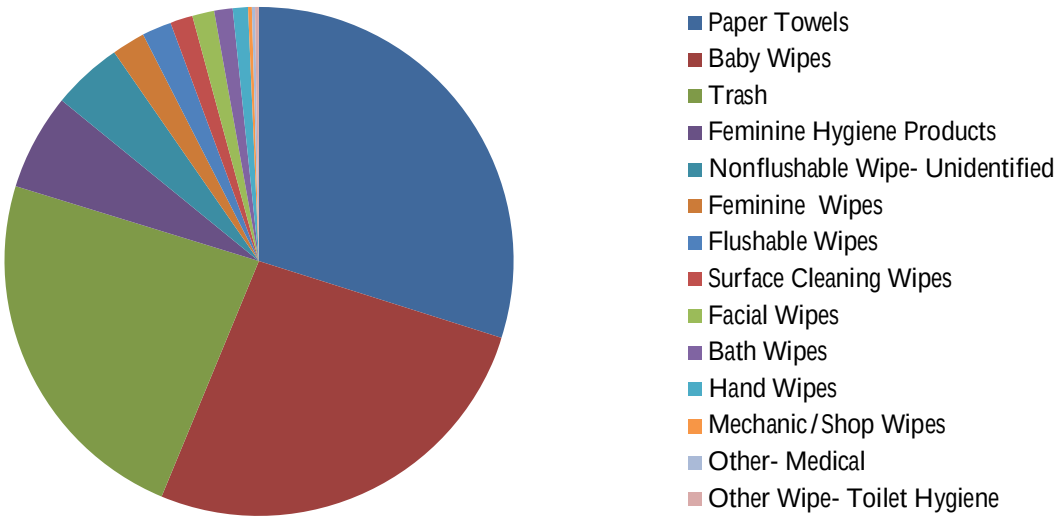


Table 4
All Materials Recovered – Manhattan Channel Sort

All Materials Recovered	Count	%
Paper Towels	127	29.88%
Baby Wipes	112	26.35%
Trash	100	23.53%
Feminine Hygiene Products	26	6.12%
Nonflushable Wipe	19	4.47%
Feminine Wipes	9	2.12%
Flushable Wipes	8	1.88%
Surface Cleaning Wipes	6	1.41%
Facial Wipes	6	1.41%
Bath Wipes	5	1.18%
Hand Wipes	4	0.94%
Mechanic/Shop Wipes	1	0.24%
Other- Medical	1	0.24%
Other Wipe- Toilet Hygiene	1	0.24%
Totals	425	100%

Figure 4 shows the breakdown of wipe materials recovered from the Manhattan Channel Sort on February 18, 2016. This breakdown does not include trash or paper towels. 65% of wipe materials recovered were various brands of Baby Wipes. *Table 5* shows the count and percentage breakdown of wipe materials recovered. *Appendix B* shows an overview of specific brands of each type of wipe found during the sort of items recovered from the Manhattan channel.

Figure 4
Breakdown of Wipes Recovered
Wards Island - Manhattan Sort - Feb 17, 2016

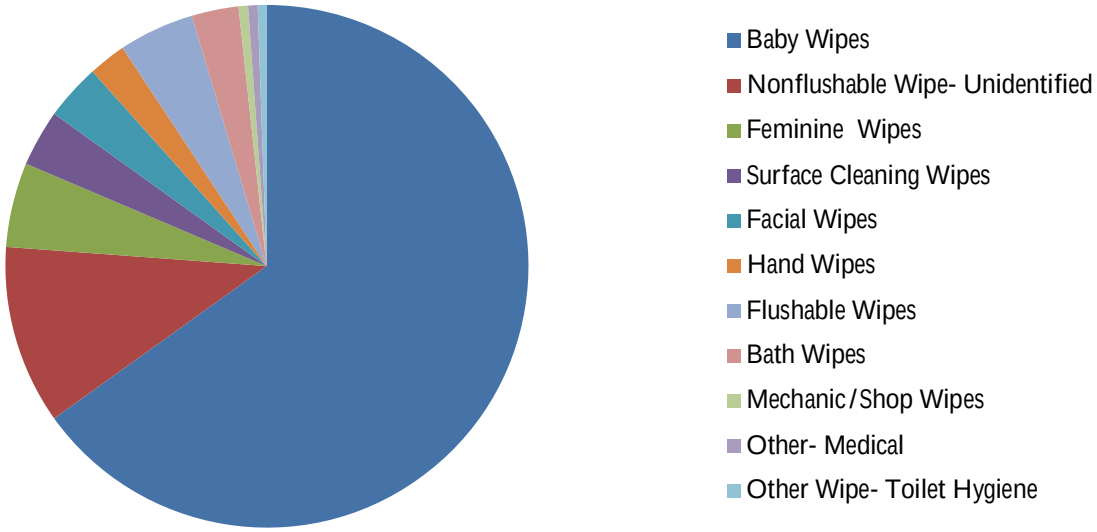


Table 5
Breakdown of Wipes Recovered – Manhattan Channel Sort

Wipe Materials Recovered	Count	%
Baby Wipes	112	65.12%
Nonflushable Wipe	19	11.05%
Feminine Wipes	9	5.23%
Surface Cleaning Wipes	6	3.49%
Facial Wipes	6	3.49%
Hand Wipes	4	2.33%
Flushable Wipes	8	4.65%
Bath Wipes	5	2.91%
Mechanic/Shop Wipes	1	0.58%
Other- Medical	1	0.58%
Other Wipe- Toilet Hygiene	1	0.58%
Totals	172	100%

For the Manhattan sample, a summary of recovered wipes is as follows:

Wipes Identified by Brand=	125
Total Wipes Recovered=	172
% Identified=	72.7%
# of Unique Category/Brands Identified=	38

8 Documenting and Archiving Recovered Items

8.1 Archiving

All items recovered were given a specific unique identification number to identify the origin of the sorted materials, using the format described in *Section 5*. Since the components are still biologically active, the items were archived in a way that minimizes decomposition.

The preferred method of archiving was lamination, using self-laminating (i.e., non-thermal) pouches distributed by ULINE. These laminating pouches are 8 mils thick, are 9 1/16" x 11 9/16" in size, and isolate the archived item from air, slowing down decomposition.

Some of the identified branded materials were found multiple times. There were over 150 wipes recovered in the Bronx sort and over 170 wipes recovered the Manhattan sort, exceeding the number of recovered wipes that were estimated during the planning process. As a result, not enough laminating pouches were present on site to archive all wipes this way, and more pouches could not be delivered to the Wards Island facility in time to be used.

After consultation with and consensus from New York City Law Department staff, the Fuss & O'Neill team prioritized laminating at least one example of each positively identified product, and laminating all items identified as flushable wipes. The Fuss & O'Neill team purchased zippered plastic bags at a retail store near the Wards Island facility, and used these to archive duplicates of the laminated products. At least one example of each positively identified product was archived by lamination. 90 items were archived using the lamination method; the remaining were placed in the zippered plastic bags.

The unique identification number, date, type of material, and brand was documented on every archived- both laminated and bagged- item using adhesive labels. The brand was archived as *Unknown* if the specific brand identity could not be determined.

Archived items were kept in a cold location to preserve the intact samples. Since the components are still biologically active, the material will continue to break down during and after the lamination process. Keeping the items at a lower temperature will limit this deterioration.

8.2 Video Recording

The entirety of the evaluation process was video-recorded to document the consistent methodology used by Fuss & O'Neill staff.

All critical activities performed by Fuss & O'Neill (including sorting, identification, archiving, and documentation of recovered items) were recorded using a SONY Handycam (model DCR-SX45). The forensics evaluation of Manhattan items performed by Ms. Strause in Maine was also recorded in this way.

The video data was saved to the portable WD "My Passport" Ultra hard drive attached as *Appendix C*.

8.3 Photographs

Photographs documenting both sides of each archived item were taken. The photos document the characteristics of each wipe recovered during the evaluation, in the event that ongoing biological decomposition of the recovered materials over time makes visual inspection less useful.

Approximately 570 photos were taken of the recovered items. These have been saved on the hard drive attached as *Appendix C*. The file name for each photo includes the unique identification number, as well as whether the photo shows the front or back of the item.

Examples of wipes archived from the Bronx and Manhattan sorts, respectively, are shown in *Figures 5 and 6*.

Figure 5:
Example of Archived Material from Bronx Sort
with Unique Identification Number

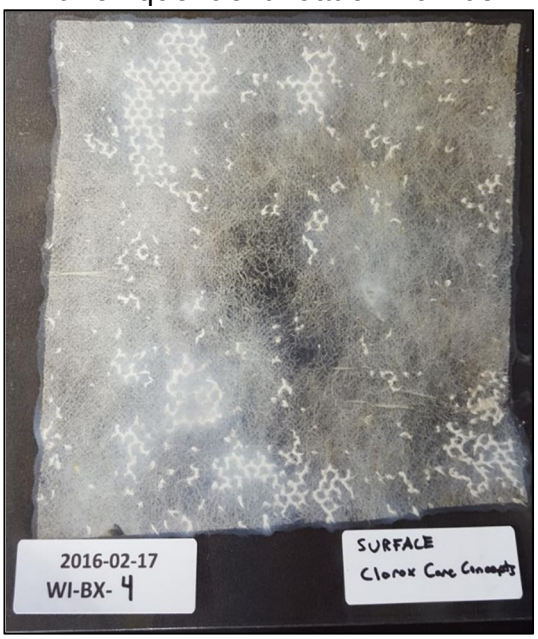
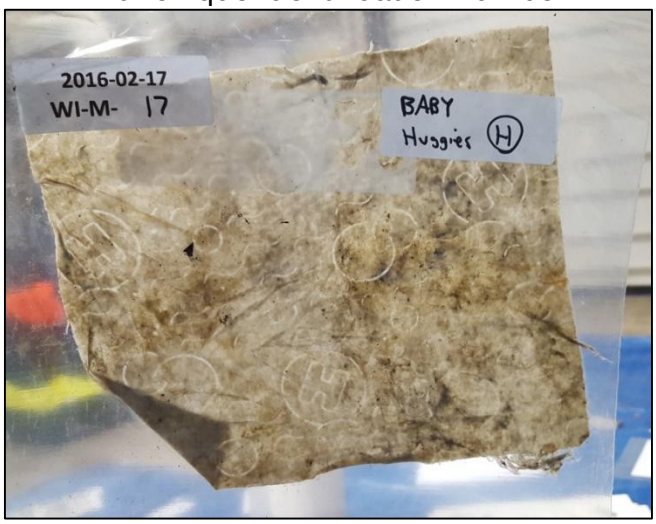


Figure 6:
Example of Archived Material from Manhattan Sort
with Unique Identification Number



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9 Conclusions

When comparing items recovered from the two sorting events, the following are observed:

- The Manhattan sample contained more individual items (425) than the Bronx sample (333).
- The Manhattan sample had a higher percentage of "flushable" wipes (4.6%) than the Bronx sample (2.5%).
- The Manhattan sample had a lower percentage of trash (23%) than the Bronx sample (30%).
- The Manhattan sample had a higher percentage of paper towels (29.8%) than the Bronx sample (18.6%).
- The Manhattan sample had a lower percentage of wipes (40.7%) than the Bronx sample (47%).
- The Manhattan sample had a higher number of unique brands identified (38) than the Bronx sample (33).
- Approximately 80% of wipes in the Bronx sample were positively identified.
- Approximately 73% of wipes in the Manhattan sample were positively identified.
- The majority of wipes that couldn't be identified in both Bronx and Manhattan samples were spunlace fabric, and were stretched or distorted to an extent that unique characteristics could not be observed.

The overall results from this evaluation differ from other forensics studies for several reasons. These include the following:

1. The study area was a combined system, resulting in a higher percentage of trash than recovered from forensics evaluations that were performed in separated sanitary sewer systems.
2. The prevalence of trash skews the results by percentage (*Figures 1 and 3*) when compared to other forensics evaluations.
3. The evaluation was performed shortly after a wet weather event. This could have created more turbulence in the system than seen in an equivalent separated sanitary sewer system, resulting in a lower percentage of "flushable" wipes than recovered from other forensics evaluations.

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Appendix A

Brands of Identified Wipes from the Bronx Channel Sort

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Table 6 - Brands of Identified Wipes

Wards Island - Bronx Sort - Feb 17, 2016

Category and Brand	Number Recovered
Baby: Huggies- Unknown version	33
Baby: Amazon Elements	13
Baby: Huggies Pure/ Soft Skin	12
Feminine Hygiene: Soft & Gentle	8
Baby: Pampers Baby Fresh	6
Baby: Well Beginnings, etc (Rockline)	6
Baby: Well Beginnings Scented (Nutex)	5
Surface Cleaning: Total Home (CVS)	4
Baby: Pampers Sensitive	4
Baby: Parents Choice (WalMart)	4
Baby: Huggies Natural Care	3
Facial: Cetaphil	3
Baby: Marvel Super Hero	2
Bath: Parents Choice (WalMart)	2
Feminine Hygiene: Playtex Personal	2
Baby: Seventh Generation	1
Baby: Babyganics Hand, Face, and Baby	1
Baby: Bumboosa	1
Baby: Honest Co	1
Baby: Huggies Cucumber	1
Baby: Little Ones	1
Baby: Members Mark (Sam's Club)	1
Baby: Water Wipes	1
Bath: equate (WalMart)	1
Facial: Murad	1
Facial: Up & Up Pink Grapefruit (Target)	1
Feminine Hygiene: Clarisse	1
Flushable: Kirkland (Costco)	1
Flushable: Wipe 'N Fresh	1
Hand: CVS Face & Hand	1
Hand: Purell Sanitizing	1
Medical: Clorox Care Concepts	2
Other: NUBY (Pacifier)	1
Wipes Identified by Brand=	126
Total Wipes Recovered=	157
% Identified=	80.3%
# of Unique Category/Brands Identified=	33

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Appendix B

Brands of Identified Wipes from the Manhattan Channel Sort

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Table 7

Brands of Identified Wipes

Wards Island - Manhattan Sort - Feb 17, 2016

Category and Brand	Number Recovered
Baby: Huggies- Unknown version	22
Baby: Pampers Baby Fresh	14
Baby: Pampers Sensitive	9
Baby: Huggies Pure/Soft Skin	8
Baby: My Fair Baby	6
Baby: Well Beginnings Scented (Nutex)	5
Baby: Amazon Elements	4
Baby: Parents Choice (WalMart)	4
Baby: Seventh Generation	4
Baby: Well Beginnings, etc (Rockline)	4
Baby: Huggies Natural Care	3
Baby: Smile & Save (Duane Reade)	3
Feminine Hygiene: Clarisse	3
Feminine Hygiene: Summer's Eve	3
Hand: CVS Face & Hand	3
Baby: 365 Everyday Value	3
Baby: Baby Touch	2
Baby: Bumboosa Bamboo	2
Baby: Johnson & Johnson	2
Facial: Equate Sensitive	2
Feminine Hygiene: Playtex Personal	2
Baby: Babyganics Face Hand & Baby	1
Baby: Honest Company	1
Baby: Little Ones	1
Baby: Tender Touch	1
Facial: Acne- Greenbrier	1
Facial: Burt's Bees Exfoliating	1
Facial: Just the Basics	1
Facial: LA Fresh	1
Feminine Hygiene: Soft N Gentle	1
Flushable: Pampers Kandoo	1
Flushable: Rockline	1
Flushable: Up & Up	1
Hand: Wet Nap	1
Medical: Clorox Care Concepts	1
Other- Toilet Hygiene: White Cloud Moist Soft Cloth	1
Surface Cleaning: Lysol	1
Surface Cleaning: Total Home	1
Wipes Identified by Brand=	125
Total Wipes Recovered=	172
% Identified=	72.7%
# of Unique Category/Brands Identified=	38

FUSS & O'NEILL

Appendix C

Photographs & Videos attached on WD Passport hard drive