

## Roll 'n' Recycle

### Truck Collection & Materials Recovery Facility (MRF) Trial

**Location:** Suez Spring Farm Recovery Facility, NSW

**Date:** 18/6/20



#### **Introduction**

A trial was conducted at the Suez Spring Farm Materials Recovery Facility (MRF) on 18<sup>th</sup> June, 2020 to assist in validating the claim that monopolymer pouches and other semi-rigid films can be recycled via kerbside when the consumer rolls up the pouch/film.

Roll 'n' Recycle is a proposed certification service provided by PREP Design Pty Ltd. The Roll 'n' Recycle mark is proposed to be licenced for use on pouches/films that meet the design specifications (TBA). A primary purpose of the trial that took place was to gain insights to refine the design specifications of the packaging materials.

#### **PREP Design recognises the essential support provided for the trial by the following partners:**

**Suez** – Facilitating and executing the truck pick up of pouches around a standard residential route, as well as accommodating the observations of packaging behaviour at the Spring Farm Recycling facility.

**OF Pack** – participated in trial think tank and supplied the 1,000 rolled up polyethylene (PE) pouches, which were secured with a PE sticker.

**Carol Lawrence** – Assisted in determining the specification and supply of sticker samples for the trial.

## **Background**

The Roll 'n' Recycle program has been under development by Anthony Peyton, Director of PREP Design since registering the trademark in Australia in 2016. He has subsequently registered the mark in the European Union, USA, New Zealand, South Korea and China.

His knowledge of how MRFs work, led him to the idea that consumers could be part of the solution by rolling the 'semi-rigid' plastic pouches into a 3D shape to prevent them from travelling to Mixed Paper at the 2D/3D separation process. This was originally verified at the SKM Recycling MRF in Melbourne in 2017.

However, this solution would only be applicable to **monopolymer pouches**, which first became commercialised by major producers around 2015: these companies currently refer to these pouches as '**Recycle Ready**'.

In 2019 PREP Design, in association with OF Pack, conducted trials at Recycled Plastics Australia (RPA) in Adelaide, which confirmed that the pouches could be successfully captured as part of the 'lightweights' stream. We also confirmed this view with Visy rPlastics in Smithfield, NSW and confirmed the demand from Plastic Forests for the recovered lightweights. Both RPA and Visy rPlastics sort and process bales from other Australian MRFs.

## **Some Hypotheses pre-trial**

For this trial, we selected a range of pouch sizes and rolling techniques to test the limits of the kerbside solution. For instance, we expected that our small and medium rolled up pouches would report as Mixed Plastic at the Suez MRF, having learned that only one stream of plastics are sorted at the site.

However, we expected that some of the large pouches would travel up the ballistic separator, particularly if flattened in the truck and we thought some of the smaller pouches may have ended up in Glass (small fraction) or Mixed Paper (medium large fraction) at the first screen.

At the NIR system, we expected that some of the larger pouches would not report to the Mixed Plastic stream as their orientation relative to the air jets would often make it hard to make it 'fly' over the wall.

Like with all hypotheses' and theories no matter how certain things are, there was only one way to see if the above would occur or not, and that was to conduct a trial that is as realistic as possible to actual consumer behaviour, truck collection and MRF processing.

### Pouch Details

All pouches were supplied by OF Pack and consist of polyethylene (PE) films, used to form the pouches.

There were three pouch sizes included:

- Small - 160mm (W) x 230mm (H) +90mm gusset
- Medium - 235mm (W) x 340mm (H) +120mm gusset
- Large - 600mm (W) x 800mm (H) - two sizes shown below (red) with explanation on next page



The small and medium pouches were clear, natural pouches with coloured PE sheets inserted into them to help them stand out (bright yellow). The large pouch was a white, printed pouch/bag predominantly red in colour.

The small and medium pouches were secured with a PE sticker approximately 75mm (long) x 25mm (wide).



The large pouch was rolled from the top to the bottom and secured with two of the stickers (pictured below as the top sample). However, once these were rolled up, we determined that the long (400mm) cylinder may not travel down the 2D/3D conveyor. In the PREP ([see apco.prep.design](#)), a 2D item is one where the shortest dimension is less than 10% of the longest dimension. The long, tightly rolled cylinder is therefore 2D i.e the diameter of the cylinder is <10% of 400mm. However, if the large pouch was lightly rolled, the item would be 3D and so will bounce down the conveyer. That said, if the loosely rolled pouches are flattened in the truck, they may also become 2D. All to be determined from the trial.

To address this likely scenario, some pouches were tightly rolled, and some were loosely rolled.

In addition, half of the large pouches were firstly **FOLDED** vertically and THEN rolled as per normal; as a result, they were approximately 200mm long and the thickness of the roll meant they were less likely to become 2D. These folded bags will be referred to as 'Large Folded' pouches/bags in the remainder of the report.



Large

Large Folded

### **Trial Overview**

Pouches/Bags – 1000 total, including three sizes

Small (representing packaging suitable for soup pouches and alike)

Medium (representing packaging for muesli pouches and alike)

Large (representing packaging for large pet food bags and alike):

The first half of the total of the rolled-up pouches were placed in 2x240l Mobile Garbage Bins (MGBs) at the Suez Ruse depot. These were collected by one of the Suez recycling trucks **immediately prior to the scheduled regular residential collection**. Prior to emptying all collected contents at the MRF, the vehicle **then collected the other half of the rolled pouches** in two more 240l MGBs at the Spring Farm MRF.

As a result, there were equal amounts of rolled pouches at both ends of the truck's total content, adequately simulating rolled pouches being disposed of throughout the community by consumers.

Upon arrival at the Spring Farm facility, the vehicle emptied the full load on the MRF tipping floor, which allowed the combined contents to be inspected by the trial team. The purpose of this inspection was to confirm whether the pouches were still rolled up and affixed by the stickers and how flattened they were after the residential pick up process, noting that plastic can have a 'memory', which means they can spring back to original rolled shape, in part or in whole, after being crushed.

The load was then placed on the conveyor after the MRF's previous contents had been cleared, to ensure what was being observed was **ONLY** the truck load containing the rolled pouches.



Suez also placed an empty skip bin on the residual line so the stream of focus could be reviewed after the pass.

To document specific sections of the trial, four GoPro video cameras were placed in strategic positions within the MRF to observe the behaviour of the pouches/bags, including:

1. Looking at 2 conveyors from the first screen for the small and medium sized fraction
2. Looking up the ballistic screen
3. Looking at the base of the ballistic screen
4. Looking up the Mixed Plastic conveyor immediately after the NIR system

There was also one person located to inspect and video the medium/large fraction conveyor (Mixed Paper) from the first screen and the 2D (Mixed Paper) conveyor from the top of the ballistic screen.

Finally, we had roaming cameras to film the overall trial from collection of bins through to the residual bins.

As a supplementary test of the NIR system, the team also waited until the conveyors were clear and then passed a box of rolled up pouches onto the conveyor immediately before the NIR.

### **Trial Findings**

The trial provided some excellent insights for all involved and generally exceeded the project team's expectations.

Key findings were:

- No pouches in small (glass) stream
- No pouches in the OCC
- Only one Medium pouch observed in the medium large (Mixed Paper) stream after the first screen
- A number of large pouches were observed in the Mixed Paper stream at the top of the ballistic conveyor. We also saw here some Medium pouches that had unrolled (see below) indicating that so long as stickers are big enough and had appropriate adhesive, this would not be a problem.





- A decent number of Medium, Large and Large Folded were present in residual bin at the end of the process. However, these bins are put through the MRF a second time as the current NIR system is quite 'inefficient' in terms of its capacity to positively sort all plastics. It was noted there were many plastic items in the residual bin including clear PET bottles and natural & coloured HDPE bottles.
- A large number of Small and Medium pouches were seen in the Mixed Plastics stream
- A significant number of Large and Large Folded pouches were seen in the Mixed Plastics

## **Discussion of Findings**

The journey and fate of the rolled-up pouches was generally 'as expected' with the majority being sorted into the Mixed Plastics stream.

Given the difficulty experienced by the Large pouches at the NIR and ballistic, the design guidelines must allow for this limitation. Asking consumers to 'Fold 'n' Roll 'n' Recycle' may be asking too much and so in the early stages of the program there will be primary focus on pouches in the Small and Medium size range.

The project team via guidelines, will also need to specify a sticker length and adhesive to maximise the chances that the pouches remain rolled. That said, the current selection of sticker performed excellently.

The pouches that were selected for this trial have been subjectively classified as '**semi rigid**'. The Roll 'n' Recycle development team will further evolve this definition in the design specifications to allow for packaging items with different wall thicknesses, which determines the level of their rigidity when rolled up and placed in consumer's kerbside recycling bins, be collected and go through the recycling process.

**Once again, the PREP Design team appreciates the invaluable support provided for the trial by SUEZ, OF Pack, and Carol Lawrence.**

Regards,

PREP DESIGN