



RUBICON

Rubicon was founded in 2008 with the mission “to end waste”

Rubicon Global is a technology company that:

- provides a suite of **SaaS products** for waste, recycling, and smart city solutions
- gathers **data and insights** for businesses and governments worldwide
- powers a **software platform**



4.9M+

Unique Service Locations

45+

Patents

55+

Cities nationwide have adopted RUBICON SmartCity™ software

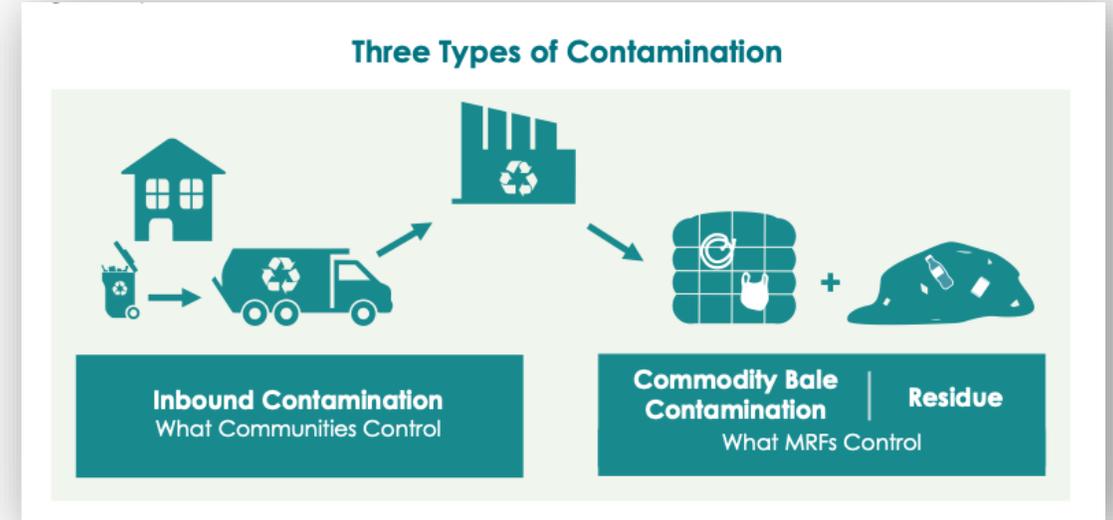
50 + 22

All 50 states + 22 countries



The Problem: Contamination at the Curb

- National average of inbound contamination for cart programs is 17.67% by weight.
- Upwards of 50% reduction in rejections at MRF
 - Conservatively it costs \$336/day to operate a waste vehicle
 - **Potential to see a \$100k savings each year just in truck operating costs alone due to reduction in rejections**
- 20-40% reduction in inbound contamination is possible
 - **Potential reduction of roughly 3 Million Pounds of contaminated contents entering stream each year**
- Improved value of material (highly dependent on City contracts)

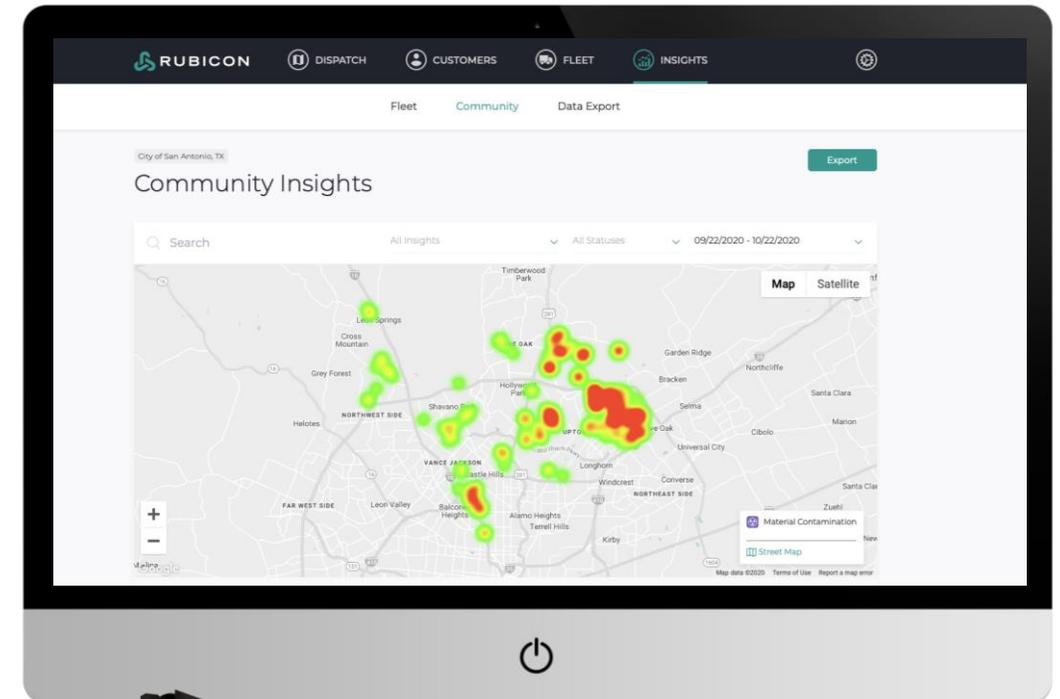


Contamination of the residential recycling stream takes three forms: contaminants in inbound materials, contaminants in commodity bales produced by the MRF, and overall MRF residues (which may contain some good commodities). MRFs and communities should work together to analyze inbound loads and pursue strategies to effectively address inbound contamination.

Mouw, S. (2020, February 13). *2020 State of Curbside Recycling Report* (Rep.). Retrieved October 2, 2020, from https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2020/02/2020-State-of-Curbside-Recycling.pdf

Rubicon's Approach: Overview

- **RUBICONVision: Enable** the City to automatically identify and record contamination, **initially at on a route-by-route level**, as the recycling is being picked up and without requiring interaction from a driver.
- **Manager Portal: Real time** reporting and operation insights. Cloud based website where images, analytics, and route data will be accessible for City staff.
- **Term: 16 Week Pilot**
 - Start: June 8th
 - End: September 25th
- **Vehicles and Tech:**
 - 8 Organic Collection Vehicles
 - Hopper Camera + RUBICONVision (Brick)
- **Operations:**
 - 4 days/week: Mon, Tues, Thurs, Fri
 - Approximately 350,000 residential customer locations



HD Camera



Rubicon Z



Recap of Residency Milestones

- ✓ **Wk 1-3: Recycling Route Data Collection/Upload & Install + Calibration**
 - ❖ Uploads and installs completed by middle of Week 3
- ✓ **Wk 3-6: Hopper Camera Begin Sending Strobe Images to Portal for City**
 - ❖ Strobe images began flowing into the portal end of Week 3
- ✓ **Wk 7-13: Algorithm Improvements to Begin “Identifying” Specific Contaminants**
 - ❖ Work on improving the material ID algorithm started at the beginning of Week 5
- ✓ **Wk 13-16: Pushing Enhanced Algorithm Image Results to Portal**
 - ❖ Images with contamination automatically identified began showing in the Portal at the start of Week 14

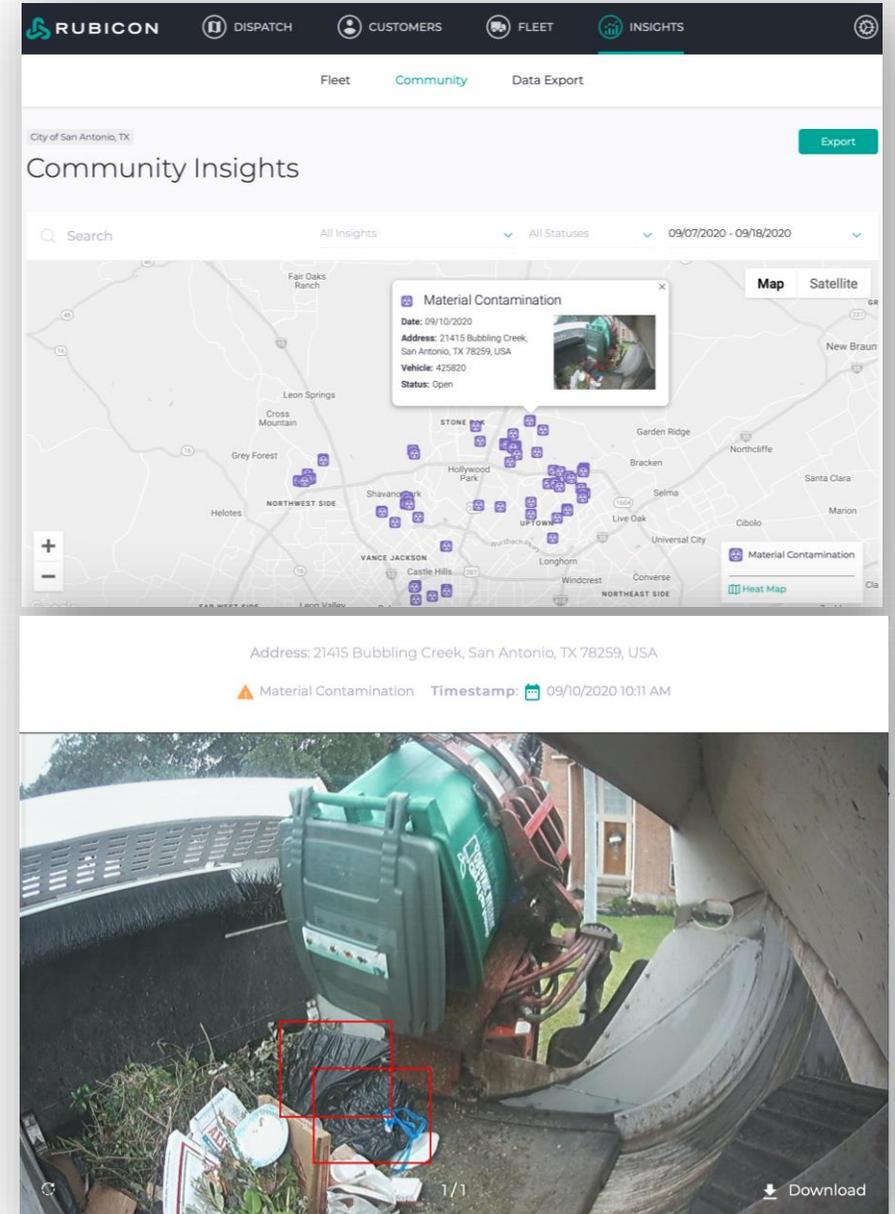
Minimum Viable Product (MVP)

✓ **Starting With The Identification of 3 Contaminants** – RUBICONVision currently identifies all the below materials, along with several others. An enhancement to the Portal UI is coming, so that the City can analyze the collected data based on material type.

- + Plastic Bag
- + Plastic bottle
- + Glass bottle

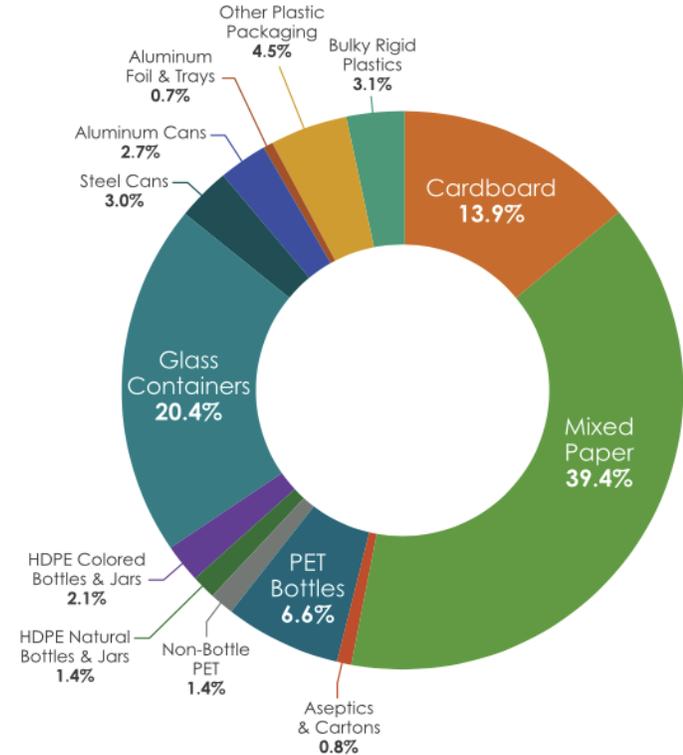
✓ **Images + Data + Insights Available In Cloud Based Portal** – All data and images are available for City review in the portal. There will also be several enhancements made to the UI in the coming weeks and months that will improve the functionality of the data collected.

□ **Identify Recycling Contamination on Route Level** – The current solution does not fully provide insight into contamination on a route level. However, deployment of Rubicon X along with future enhancements coming to RUBICONVision will remedy this.



The Results: Key Findings From Residency

- 252 Instances of Contamination
 - Over 29 Days
- 38-50% of routes collected contaminated containers on a daily basis
 - Estimate 612 to 806 contaminated organic routes per year
- **Potentially more than \$400k in additional tip fees caused by rejected loads each year**
 - Assuming the average tip fee is \$40.62/ton*

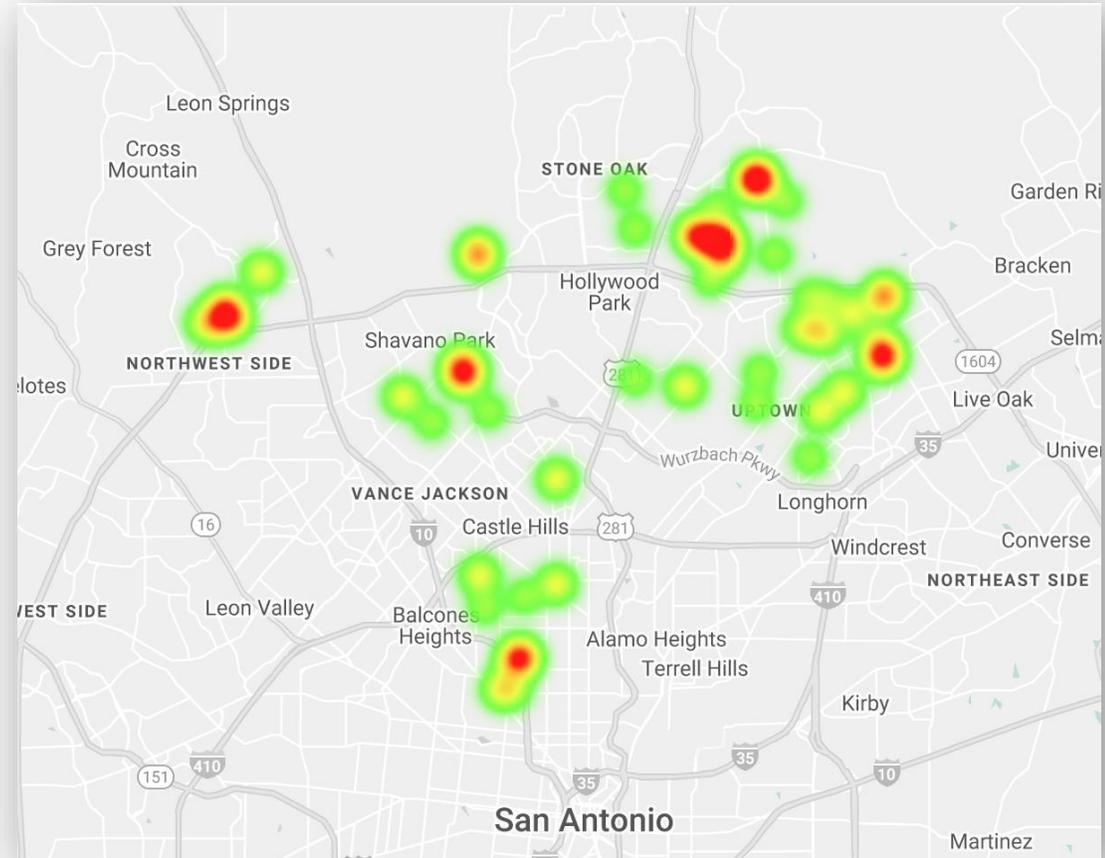


Estimate of Annual Curbside Recyclable Material Generation per Single-Family Household – **The Recycling Partnership: 2020 State of Curbside Recycling Report**

*Staff, W. (2019, October 29). EREF releases analysis on national landfill tipping fees. Retrieved October 02, 2020, from <https://www.wastetodaymagazine.com/article/eref-releases-analysis-national-msw-landfill-tipping-fees/>

How does this help SWMD?

- **Education:** The data captured by RUBICONVision will empower the City to target education to hotspots around the city
- **Driver Safety:** RUBICONVision allows the drivers to focus on their main task, keeping themselves and those in the community safe.
- **Sustainability:** Ultimately, the data collected will be integral in driving up the City's organics/recycling participation rate and decreasing the level of contamination in their respective streams.



Review of Residency Program

- **Public + Private Partnership:** A creative solution to foster relationships between the public and private sector to solve real-world problems.
- **Best-In-Class:** The most professional, creative, and exciting pilot program in which Rubicon has participated.
- **San Antonio Team:** The entire team, and primarily the SWMD team, were ideal development partners.



Thank you!

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