PRESERVATION OF LANDFILL AIRSPACE: ASPHALT SHINGLE RECYCLING

ROOFS TO ROADS: CAROLINA RECYCLING ASSOCIATION

WILMINGTON, NC

03-29-2023

WWW.WASTEALLIANCEGROUP.COM

WAG
WASTE ALLIANCE GROUP

WHAT IS WASTE ALLIANCE GROUP?

- We are a non-profit, membership organization, with a focus on North Carolina waste related issues;
- We provide Operational Training for Landfills and Transfer Stations
- We provide data analysis of publicly available reports
- We provide peer support based on experience with the goal of continual improvement

MISSION STATEMENT

Our mission is to collect, interpret, and provide relevant data, reports, and training to our members, vendors, and others who are interested in improving waste management in North Carolina. WAG serves all waste markets: solid waste, liquid waste, industrial waste, recovered materials, reusable materials, recycling and upcycling.

WAG
WASTE ALLIANCE GROUP

DENSITY IMPROVEMENT

PART OF WAG'S LANDFILL OPERATIONAL CONFERENCE PROGRAM

- DENSITY IMPROVEMENT PLANS
- GPS AT LANDFILLS
- ALTERNATIVE DAILY COVER
- RIGHTSIZING EQUIPMENT
- NCDEQ UPDATES
- HOW TO SELL YOUR IDEAS TO UPPER MANAGEMENT

SIGN UP WITH DISCOUNT: 'EARLYBIRD' TO SAVE $50!

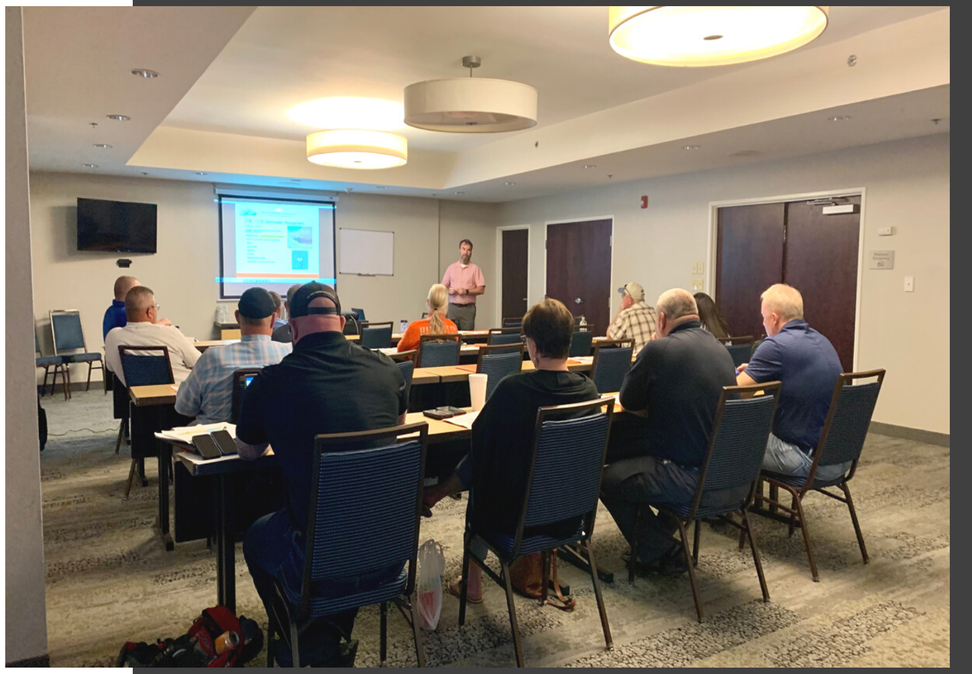
TRAINING LOCATION IN :

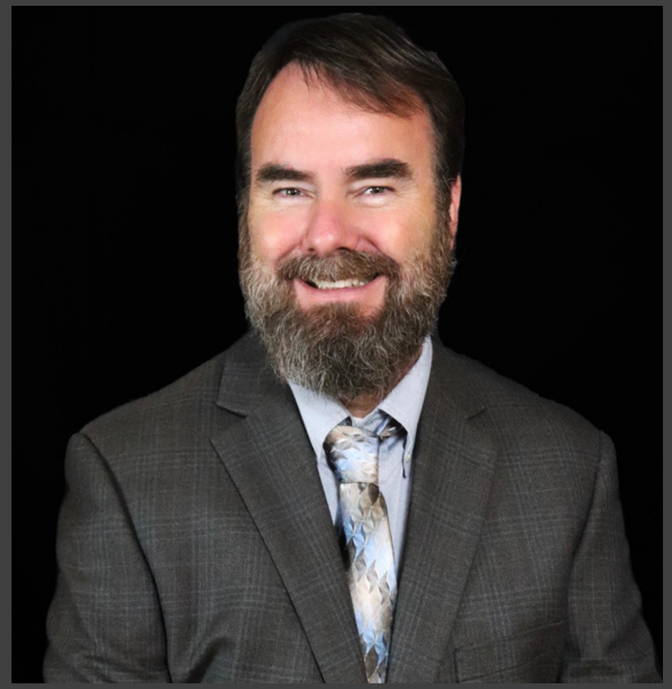
HARRAH'S CHEROKEE CASINO RESORT

777 Casino Dr, Cherokee, NC 28719

May 2-4, 2023

AGENDA





Raymond Hoffman

President of
HNA Engineering, PLLC

INTRODUCTION

20+ years of solid waste experience including Owner's rep for (18) MSWLF's, (32) TS and (6) MRF's across (6) states, Contractor for (5) cell construction events completed over a 10-month span, and as a Consultant. Formerly served on the NCSWANA Board, Chair of the Technical Committee and continuing as a Certified Instructor for Compost. Co-founder of the non-profit Waste Alliance Group in 2021, where we seek solutions and improvements for waste related issues that are specific to North Carolina.

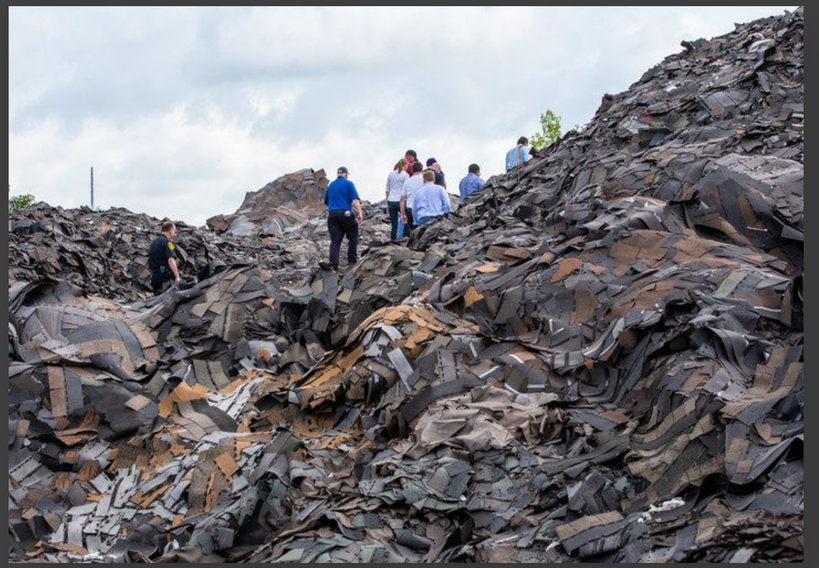
WAG
WASTE ALLIANCE GROUP

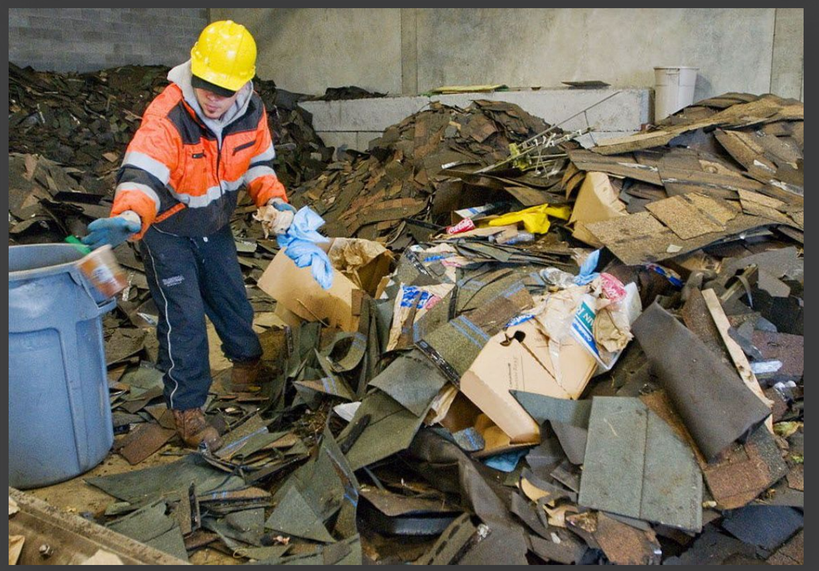
PERMITTED LANDFILL AIRSPACE

Finite Amount

- State of North Carolina as of 2020-2021 has 261M tons of MSW disposal capacity remaining or approximately 25.7 years
- State of South Carolina had 12.3 M tons of Total Solid Waste Disposed of in 138 permitted landfills in 2022…77 Class 2 (C&D) – 3.7 M tons disposed, avg. Tip Fee (49 of 79) = $32.00/ton, **80 C&D Debris Recyclers**

- Unlike food waste that breaks down quickly in a landfill, asphalt shingles will likely take between 300-400 years to fully decompose
- (1) bundle of asphalt shingles will consume approximately 0.10 to 0.20 cubic yards of airspace
- Assuming (54) bundles per average roof = 5.4 to 10.8 cy





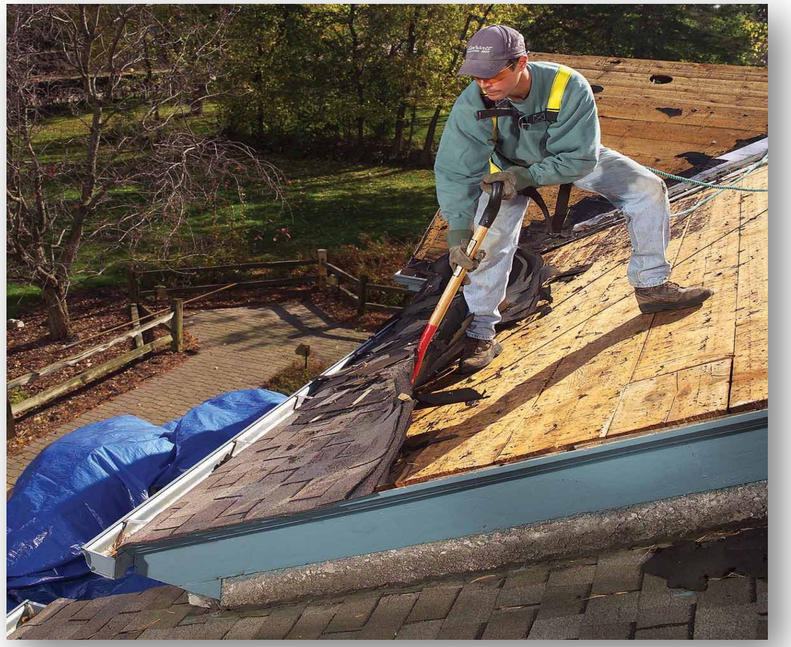
RECYCLING BY **COMMODITY**

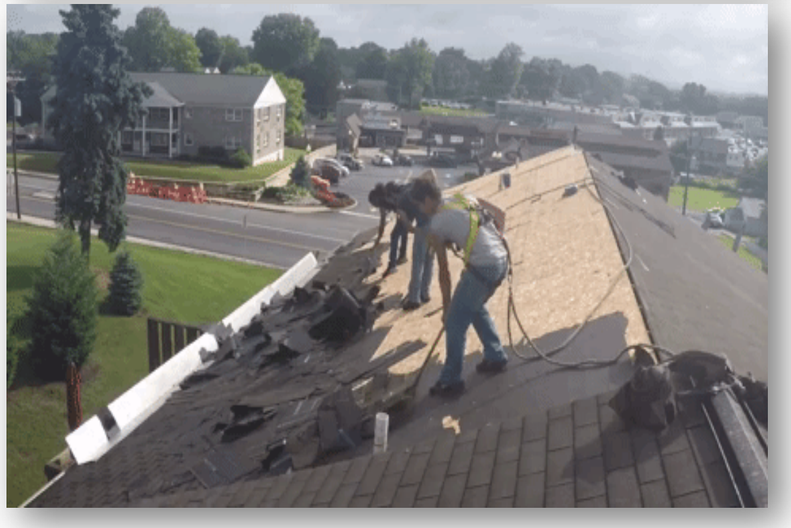
The Act prioritizes MSW and the safe, efficient, and environmentally responsible management of it. The Act defines MSW and what items must be measured and counted toward the state's waste reduction goals. South Carolina measures recycled MSW by the categories listed below. Each of the eight categories is comprised of specific items (i.e., commodities).

1. **Glass** is a traditionally accepted recyclable that includes containers and packaging (e.g., brown/amber, clear/flint, green, mixed), and glass from furniture and electronics. However, glass has recently been less accepted by programs due to markets.
2. **Metal** is a traditionally accepted recyclable that includes aluminum cans, ferrous, non-ferrous, steel cans, and other mixed scrap metal.
3. **Paper** is a traditionally accepted recyclable that includes cardboard, magazines, mixed paper, newspaper and inserts, office paper, and paperboard.
4. **Plastic** is a traditionally accepted recyclable that includes PET (#1), HDPE (#2), vinyl (#3), LDPE (#4), PP (#5), PS (#6), commingled PET and HDPE, and other mixed plastic.
5. **Banned items** are listed in the Act or other legislation and cannot be disposed of and must be recycled. Those items include appliances, electronics, lead-acid batteries, used motor oil, and whole tires. Yard trimmings are banned from Class 3 landfills, but may be disposed of in Class 1 or Class 2 landfills.
6. **Miscellaneous items** include antifreeze, cooking oil, fluorescent bulbs, hazardous household material, inkjet/toner cartridges, mattresses, paint, rechargeable batteries, textiles, used motor oil filters, and wood packaging as well as other specialty items. These items vary by program.
7. **Organics** include yard trimmings and food waste. Yard trimmings are banned from Class 3 landfills but may be disposed of in Class 1 or Class 2 landfills. This year, yard trimmings made into mulch or compost and used as alternative daily cover were counted as recycled material.
8. **Commingled items** – also known as single stream – are recyclable items collected together, not sorted by type. Tables 6.1 through 6.8 provide a breakdown of commodities recycled by county for FY22.

ROOFS

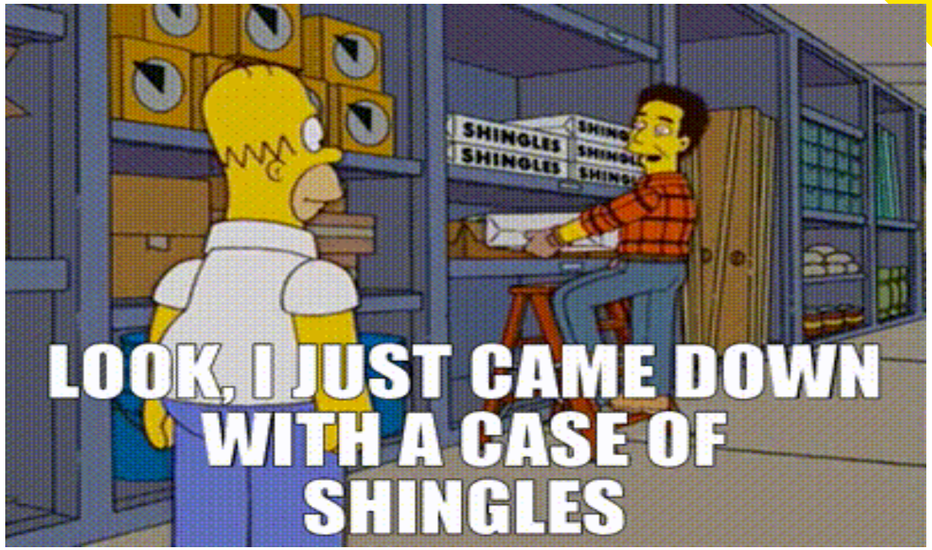
- North Carolina has an estimated **4.7 M** roofs (Census 2020)
- South Carolina has an estimated **2.4 M** roofs (Census 2021)
- Assume 60% are asphalt shingles with 10% replaced annually = **282,000 roofing projects in NC & 144,000 in roofing projects in SC**
- A 30-ft x 50-ft house will have a roof that covers approximately 1,800 sq.ft. = 18 square
- (3) bundles of shingles per square = 54 bundles
- (1) bundle = 50 to 80 pounds
- 2,700 to 4,320 pounds (1.35 to 2.16 tons) of asphalt shingles per roof
- Potential to have **575,100 – 920,160 tons** of asphalt shingles being landfilled annually in both states

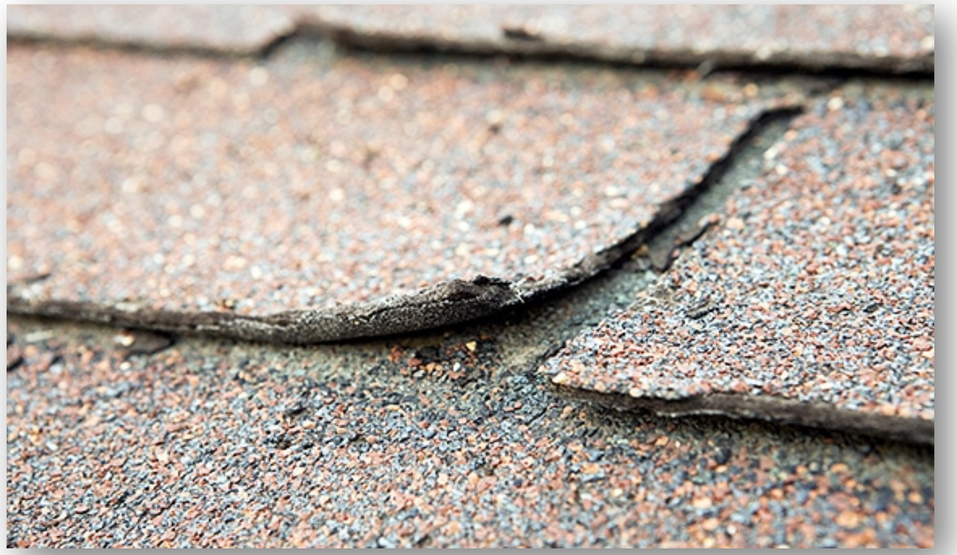




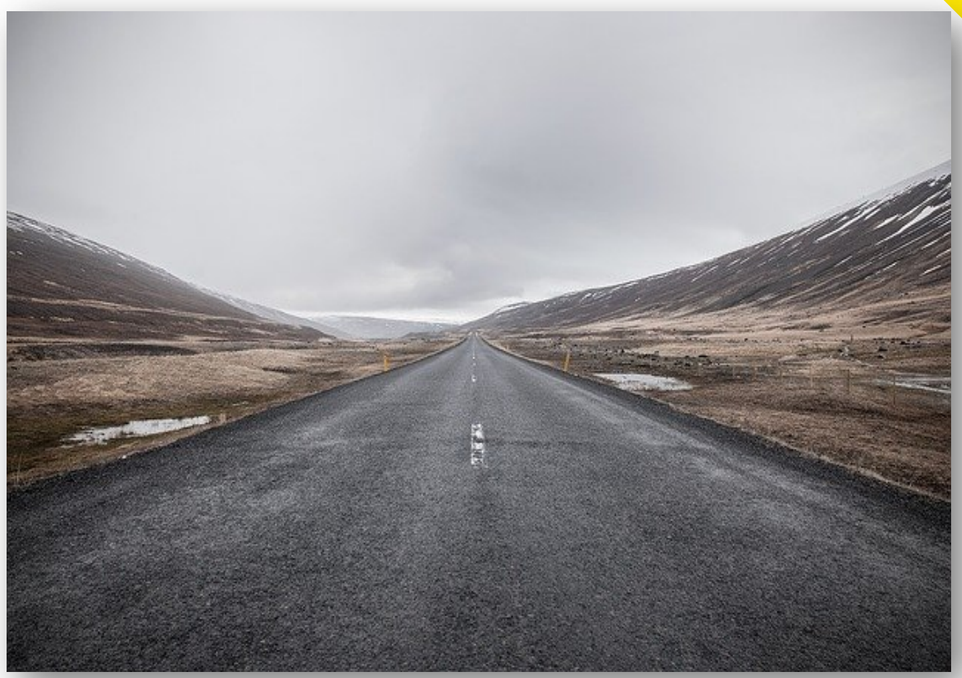
ASPHALT SHINGLE

- Contains: fiberglass or cellulose matt, **asphalt** and mineral granules
- Typical bundle weighs between 60-80 lbs.
- 20% is asphalt or approximately 12-16 lbs./bundle
- 25% granules
- 43% limestone and dolomite filler
- 5% Fiberglass mat
- 7% Back surface (sand/talc)
- 54 bundles per roof x 12-16 lbs./bundle = 648-864 lbs. of liquid asphalt
- Full weight recycling purposes, approximately 3,240-4320 or 1.6-2.2 tons per roof





PAVING INDUSTRY



What makes an asphalt road?

- Aggregate
- Asphalt Binder

How many road miles in NC & SC?

- North Carolina **80,000** Miles of Roadway (NCDOT)
- South Carolina **41,000** Miles of Roadway (SCDOT)

2022 prices for asphalt binder at $482.50 - $733.00 (Fed Highway Admin)

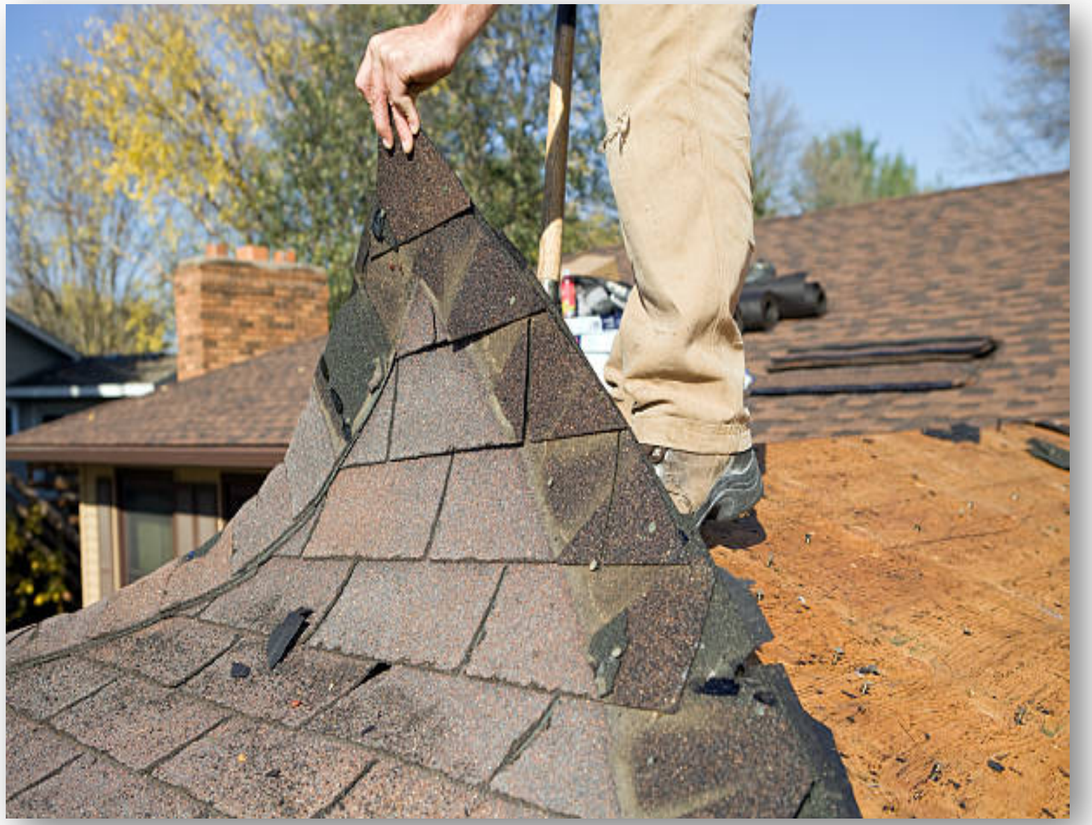
How many tons of liquid asphalt per mile of road? Assume road is 24 feet wide with 2 inches of asphalt.*

- 1,548 tons of asphalt at 6% liquid asphalt binder = 93 tons

POST CONSUMER RECYCLED ASPHALT SHINGLES (**PRAS**)

The North Carolina Department of Transportation has allowed the use of recycled asphalt shingles (RAS) in their mixes since 2011. Recyclers are required by North Carolina Environmental Quality (NCDEQ) to submit an operation plan or obtain a waste processing permit before accepting shingles. NC DEQ requires recyclers to test incoming loads for asbestos before processing.

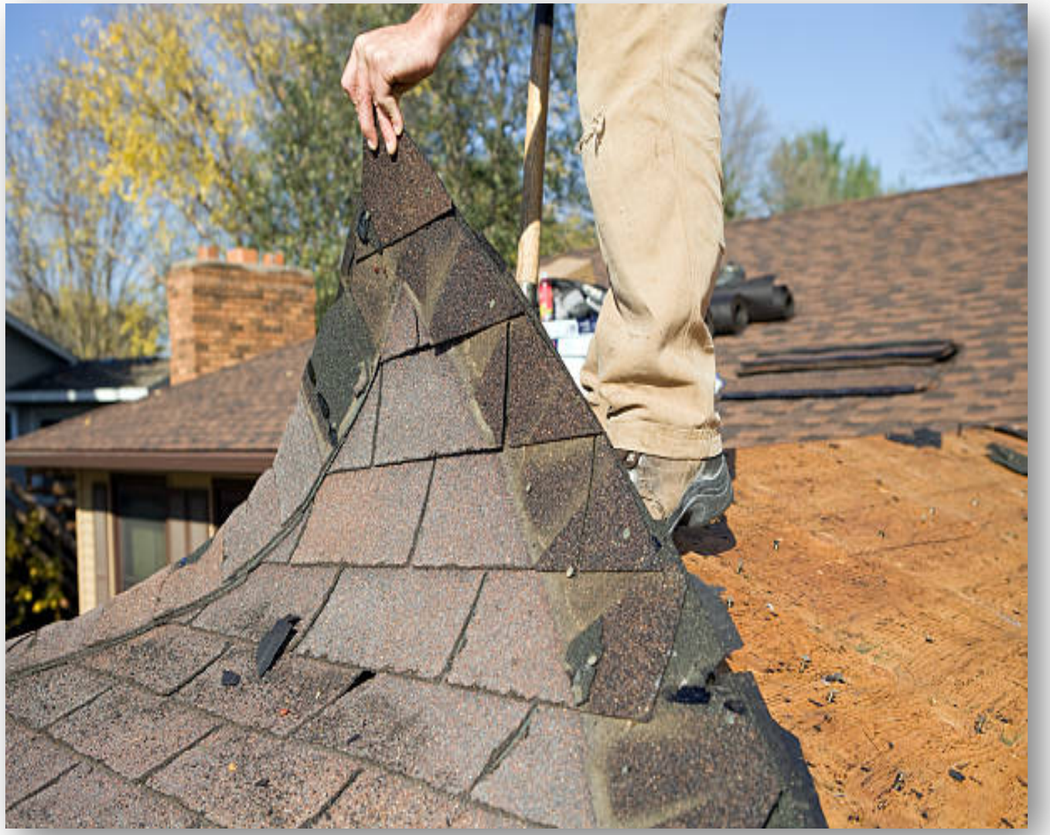
The Carolina Asphalt Pavement Association (CAPA), NC DENR Division of Waste Management, NC DENR Division of Air Quality, and NC Department of Transportation have developed a "Best Practices" guide for recycling asphalt shingles in North Carolina.



SOUTH CAROLINA : **SC-M-407**

SCDOT has Supplemental Technical Specification for the usage of Recycled Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS)

The continued use of recycled materials in asphalt mixtures, including reclaimed asphalt pavements (RAP) and reclaimed asphalt shingles (RAS), conserves raw materials, provides an economic benefit through material cost savings and improved material performance



PROBLEMS WITH RECYCLING

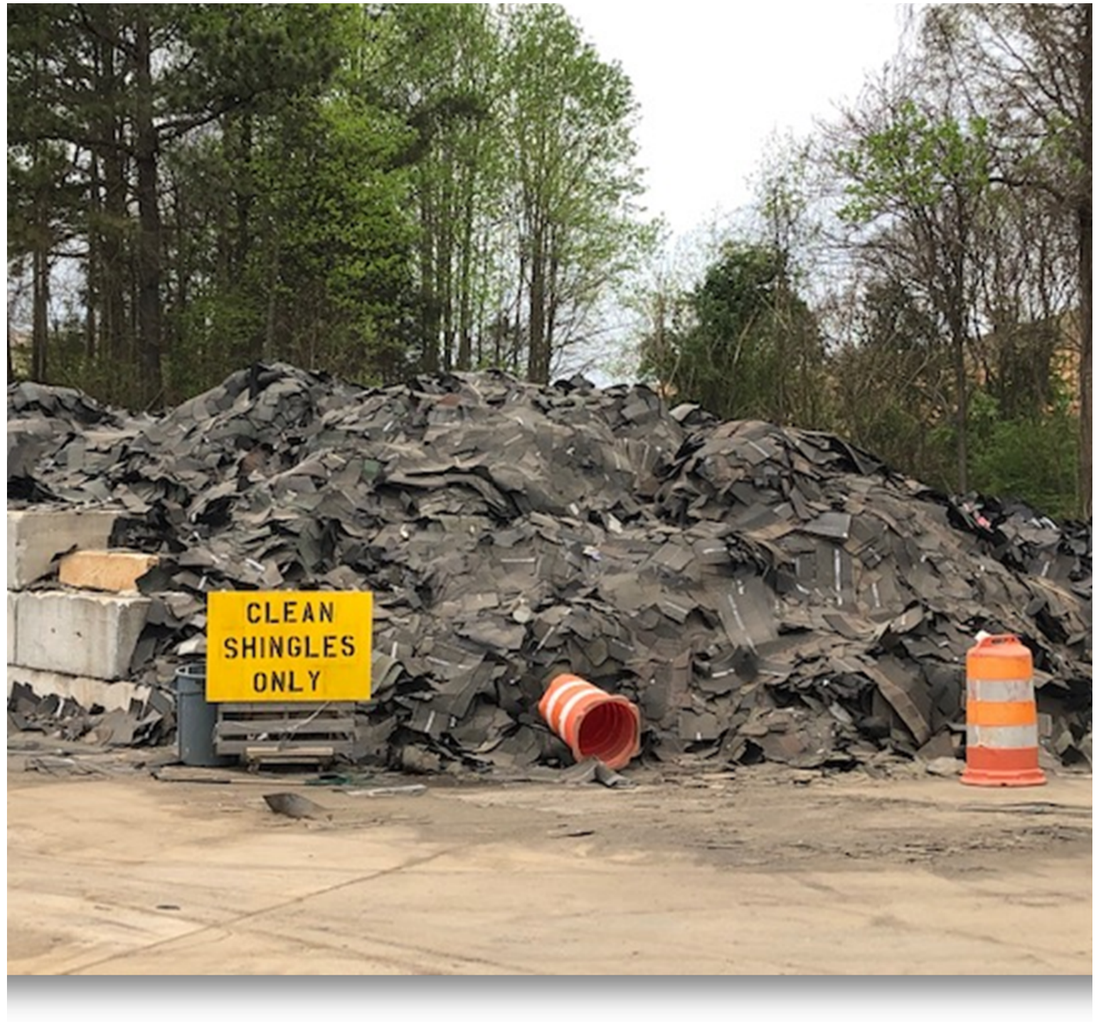
- Shingles and contamination – mud, plastics, wood, metal
- Size reduction – how to melt out the “chunks”
  - Single pass shredder – adds cost
  - Second pass shredder / pulverize – adds more cost
- Road surface breaking apart due to insufficient melting
- Costs for storage, handling, size reduction, transportation and additional melting
- Fluctuations in the Crude Oil Market/ Liquid Binder
- When oil pricing is high, recycling is attractive
- Hard to stop and start a recycling program – needs to be continuous and flexible

Monthly Terminal Asphalt Binder & Fuel FOB Prices (NCDOT)

Date	English Fuel Price	Metric Fuel Price
3/1/2023	2.7901	0.7371
2/1/2023	3.4755	0.9181
1/1/2023	3.1468	0.8313
12/1/2022	3.8413	1.0148
11/1/2022	4.2569	1.1246
10/1/2022	3.4665	0.9158
9/1/2022	4.1524	1.0969
8/1/2022	3.7538	0.9916
7/1/2022	4.5239	1.1951
6/1/2022	4.8185	1.2729
5/1/2022	4.1485	1.0959
4/1/2022	4.3349	1.1452
3/1/2022	3.0794	0.8135
2/1/2022	2.7923	0.7376
1/1/2022	2.3789	0.6284
12/1/2021	2.4615	0.6503
11/1/2021	2.6786	0.7076
10/1/2021	2.3102	0.6103
9/1/2021	2.1926	0.5792
8/1/2021	2.1637	0.5716
7/1/2021	2.2313	0.5894
6/1/2021	2.2314	0.5895
5/1/2021	1.9310	0.5101
4/1/2021	2.0158	0.5325
3/1/2021	1.9368	0.5116

PROBLEMS **SOLVED**

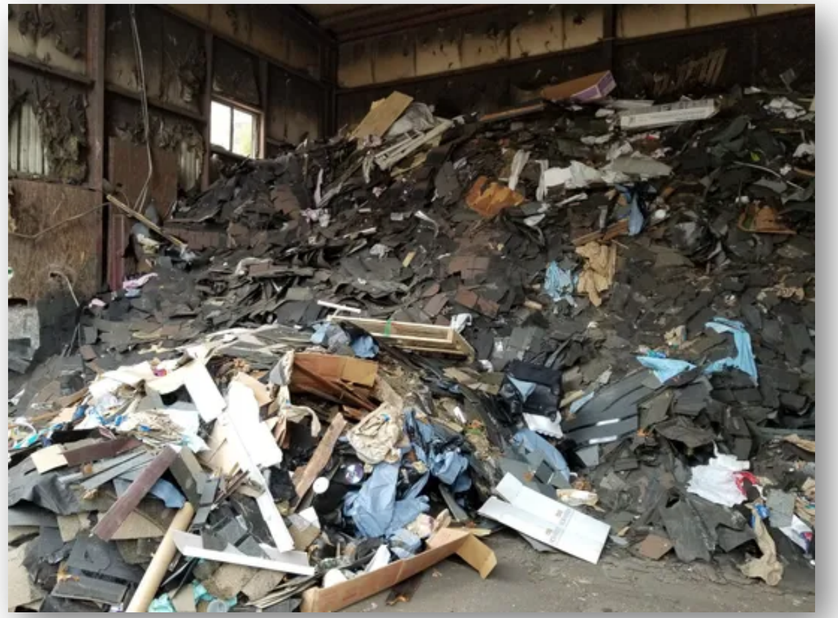
1. Shingles and contamination – incentivize contractors to bring “clean”, shingles only for drop off
2. Size reduction – shred to smaller sizes
3. Asphalt plant equipment to melt out the liquid asphalt prior to and separate from the full mix operation
4. Costs for storage, handling, size reduction, transportation and additional melting…still a problem
5. Fluctuations in the Crude Oil Market – with oil prices on the rise, asphalt shingle recycling is more viable
6. Landfill disposal pricing also on the rise.
7. Landfill Airspace preserved for Waste Materials that cannot be recycled



Does it make sense for this material to occupy landfill airspace?

PROBLEMS REMAIN

1. Education of Roofing Contractors to separate shingles from other debris at the source
2. Education of waste companies on selling separate boxes at construction sites to keep shingles separated – may get discounts at landfills – may get to bypass landfills completely
3. Potential worker exposure for asbestos containing materials
4. Size reduction – shred to smaller sizes, is it better to do this at the collection site or at the asphalt plant
5. Asphalt plant equipment to melt out the liquid asphalt, keeping the “chunky” flow moving. A blockage at the plant could be very costly to undo.
6. Costs for storage, handling, size reduction, transportation and additional melting…still a problem…who gets paid and how much?
7. Landfills, extra handling and storage space
8. Acceptance by DOT’s, increased percentage allowed…currently at 3%, could go to 6%
9. Fluctuations in the Crude Oil Market – oil prices peaked in June 2022 at $4.82, now $2.79/gallon



RECOGNIZING THE VALUE OF RECYCLING AND WASTE REDUCTION

1. NC Executive Order #17 (2022) – "…reduce the amount of recyclable materials and waste that goes into landfills…"
2. SC SECTION 44-96-50(E) – "It is the goal of this State to recycle, on a statewide basis, at least thirty-five percent, calculated by weight, of the municipal solid waste stream generated in this State…"
3. Asphalt Roofing Manufacturers Association (ARMA) – "Asphalt shingles are recyclable"
4. National Asphalt Pavement Association (NAPA) – "1.96 Million tons of reclaimed asphalt shingles (RAS) were used in new asphalt pavement mixes in the U.S. in 2014"
5. North Carolina DEQ (NCDEQ) – "Asphalt shingles are considered clean if metal, wood, insulation, flashing and other trash are removed."

QUESTIONS?

THANK YOU