

SALT BRINE ENVIRONMENTAL STEWARDSHIP



APRIL 15, 2022



2022 CEAM SPRING CONFERENCE

PAUL RICHARDSON

Maryland Department of Transportation
State Highway Administration
Paul Richardson & Scott Simons

- 12 Years with MDOT SHA
- Inspector for the WWB TAMS contract
- Resident Maintenance Engineer at Fairland shop
- Project manager for the MCARS assessment for MDOT SHA
- Project Manager for the automated CICO for “Hired winter Equipment”
- MDOT SHA’s Resident “BRINE MAKER GURU”



Kris Jagarapu, P.E.

Bureau Chief, Bureau of Highways,
Howard County DPW

- Over 20 years of experience in the Public and Private sectors
- Bureau Chief of Highways for the past 3 ½ years
- Lives in Ellicott City, MD
- Avid tennis fan, still “thinks” he can keep up playing with his 16 year old son



BIOGRAPHY

Steve Walsh PE, Deputy Director
Harford County DPW



Division of Highways (Operations, Engineering)

Division of Environment & Sustainability

(Solid Waste management, Construction
Inspection, Stormwater Management & Dam
Safety, Watershed Protection and Capital
Project management) .

BS in Civil Engineering 1987 / University of Maryland

OBJECTIVES

Salt Brine Environmental Stewardship – MDOT SHA, Howard County and Harford County

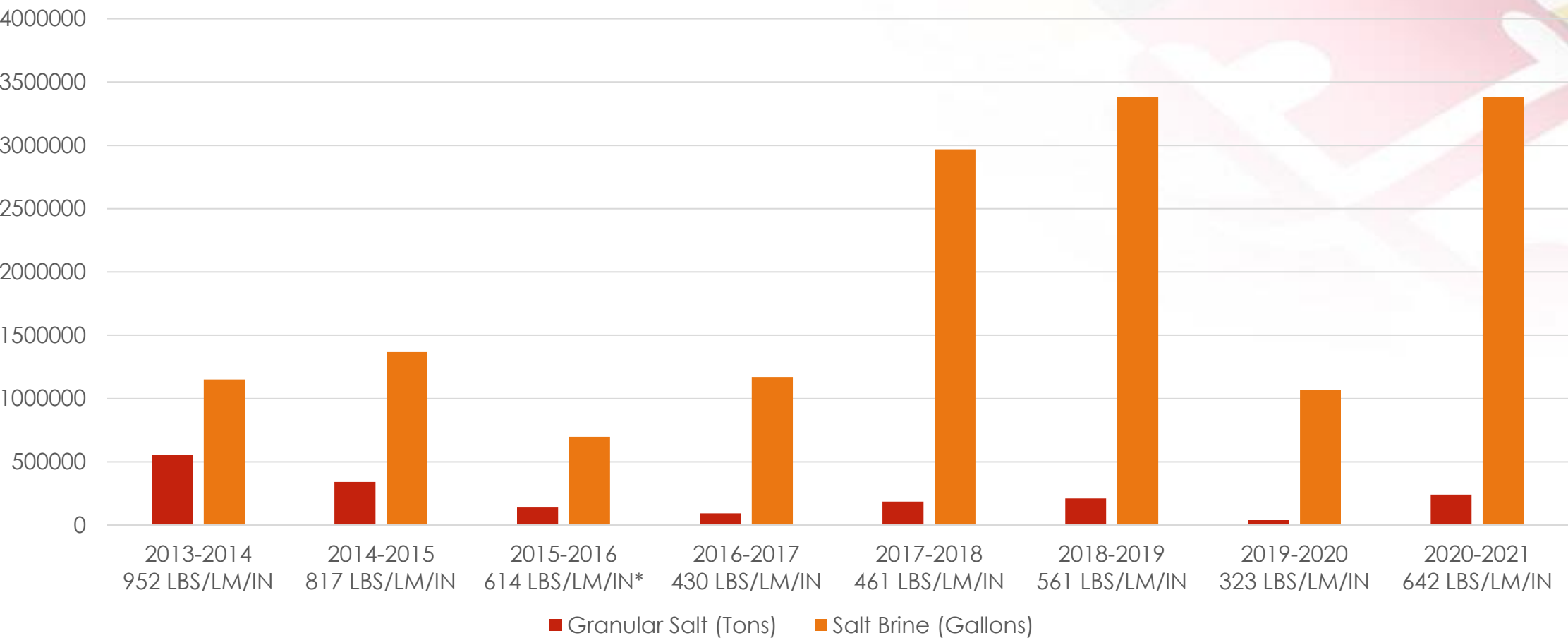
- Share experiences with Salt Brine operations
- What we do
- Why we do it
- What we have learned
- 1.0 PDH



WINTER RESOURCES

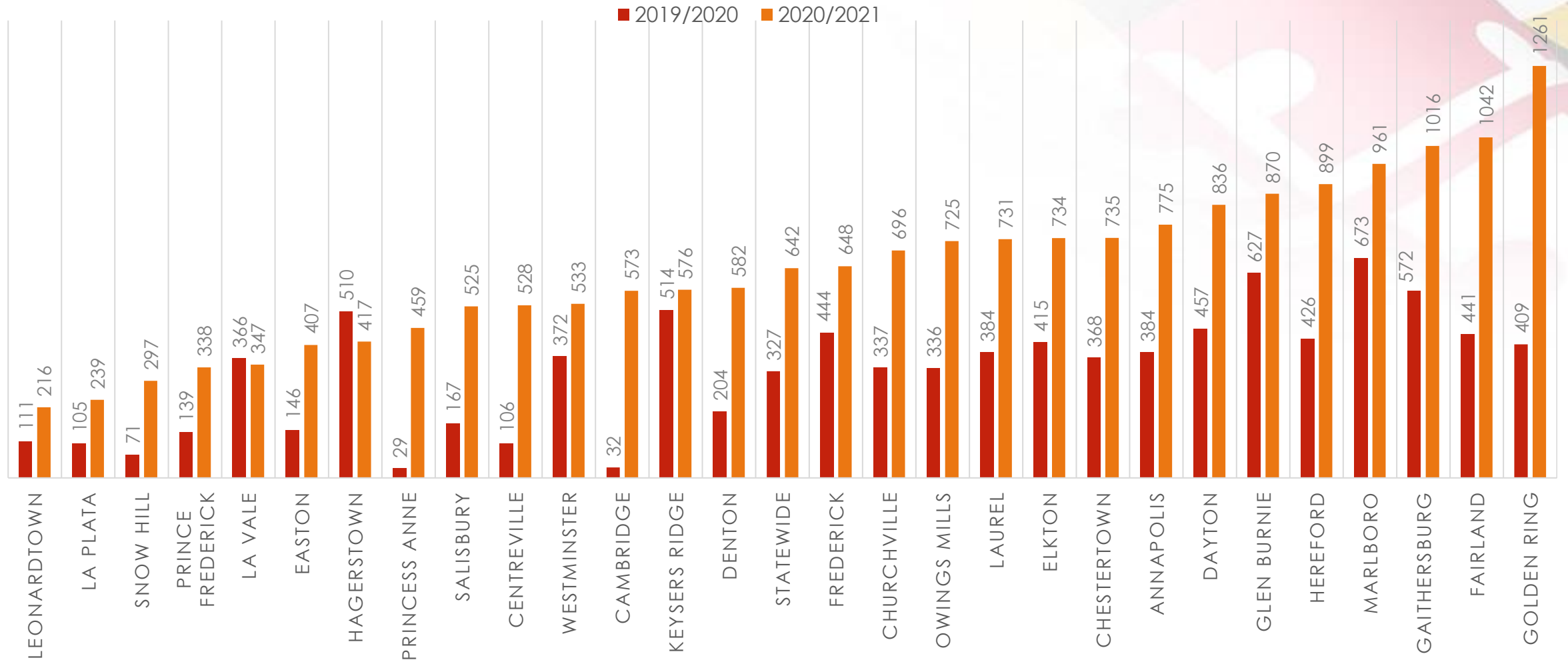
- ~1,100 Maintenance Shop Employees
 - ~740 Field Employees
 - ~110 Managers
 - ~200 Administrative Staff and Mechanics
 - ~50 Winter Volunteers
- ~600 MDOT SHA Dump Trucks
- ~2,200 Hired Equipment Contractors
- \$71 Million Winter Budget
- ~385,000 tons Rock Salt
- ~1.7 million gallons Salt Brine storage

RESOURCE USAGE DATA



* Minus blizzard data

SALT USAGE STATISTICS



AUTOMATED BRINE MAKERS



- 10 of the 14 are completed and fully operational
- Can make upwards of 8000 gallons of brine an hour
 - With a proper water source
 - Solar salt
- Training is currently ongoing

- Augured self clean out
- Can fill trucks (3 at one time) and continue to produce brine at the same time
- Can be controlled from anywhere there is a cell signal while using a tablet



AUTOMATED BRINE MAKER INSTALLATIONS



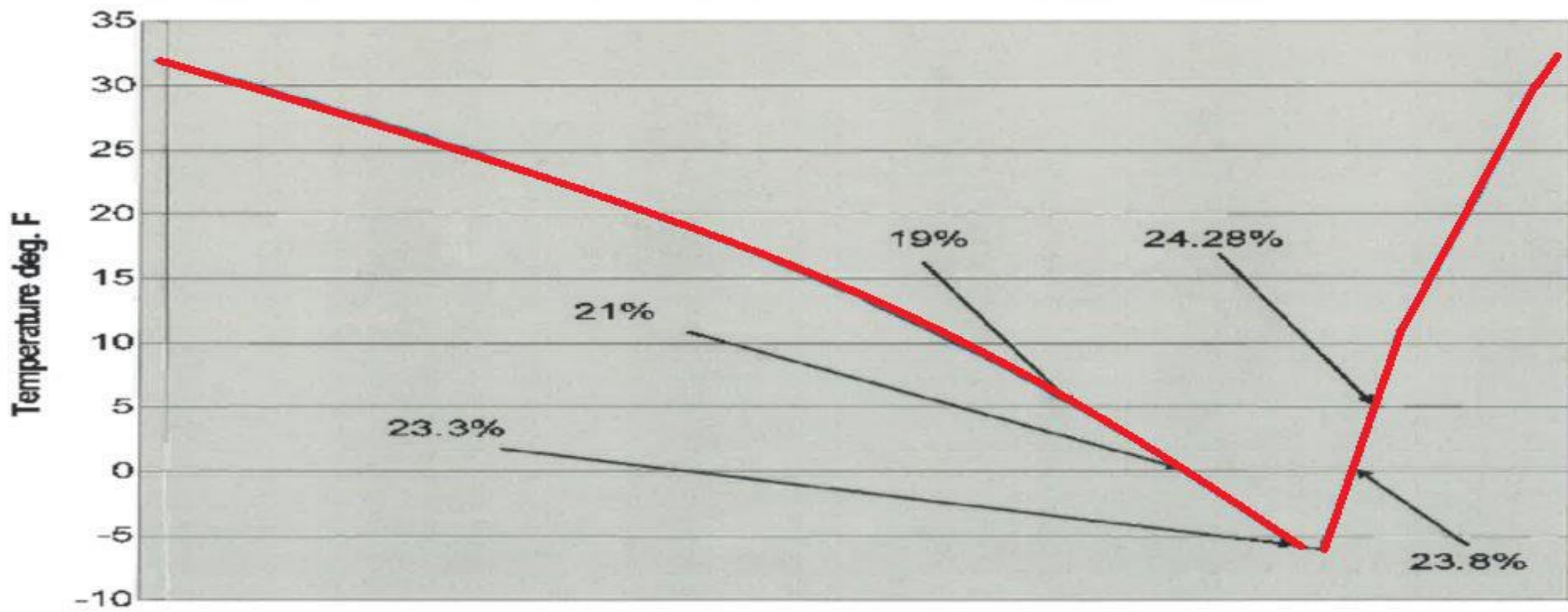
Automated Clean Out

Shop Installation



BACK TO THE BASICS

Why 23.3% Concentration?



BRINE COMPARED TO GRANULAR

- 1 ton Granular = 5 lane miles average
- Needs time to work
- Increase before decrease
- Set and forget application rate
- 1 ton = 750 gallons = 9.5 lane miles average
- Works right away
- Decrease instantly
- Circumstantial application rates

BRINE MAKER + INSTALL COST

- Machine \$220,000
- Shed/structure \$10,000+
- Plumbing \$35,000
- Electrical \$30,000
- Average cost for storage \$12,000/10k gallons
- Other options ...



Salt Brine Environmental Stewardship – Howard County's Experience

Kris Jagarapu, P.E.

Chief, Bureau of Highways, Howard County DPW

April 15, 2022



Howard County, MD



- Estimated population – 334,500
- Over 3650 County owned and maintained roadways
- 1060 centerline miles of roadway
- 87 Snow Routes

Legend

- State Road
- County - Secondary/Minor Hwy
- County - Intermediate
- County - Local Road
- Private Road





Equipment / Materials

■ Materials

- 32,500 tons of salt
- 58,000 gallons of salt brine
- 23,500 gallons of magnesium chloride

■ Equipment

- 61 10T Single axle trucks
- 6 5T trucks
- 3 triaxle trucks
- 48 pick-up trucks
- 15 loaders
- Complemented by 60 pieces of contractor equipment



Salt Brine – Where did it all start?

- Reduce amount of salt usage along County roadways
- “Reduce Bounce”, “Activate the Salt” : **PRE – WETTING**
- “Be Pro-active” : **ANTI-ICING**
- “React to icy condition calls” : **DE-ICING**

Pre-Wetting



Pre-Wetting



Anti-icing

- Snow Emergency Routes
- Pretreating of over 400 lane miles of roadway



Direct Liquid Application Route

- DLA route – 20 lane miles
 - Little Patuxent Pkwy
 - Cedar Ln
 - Hickory Ridge Rd
- Application rate – 50 gal/lane mile?
- Frequency of reapplication



Salt Brine - Challenges

- Old brine maker
- Inadequate storage
- Contractor dependency
 - Application rate?
- Water supply

New Brine Facility – Under Construction



New Brine Facility – Almost ready



Slide-in tanks



Slide-in tanks





Salt Brine – Lessons Learned, Encouraging Excellence

- Find a “Champion”
- Get the buy in – Administration, Staff, and Public
- Don’t be afraid to try
- Incremental changes
- Track changes and make adjustments

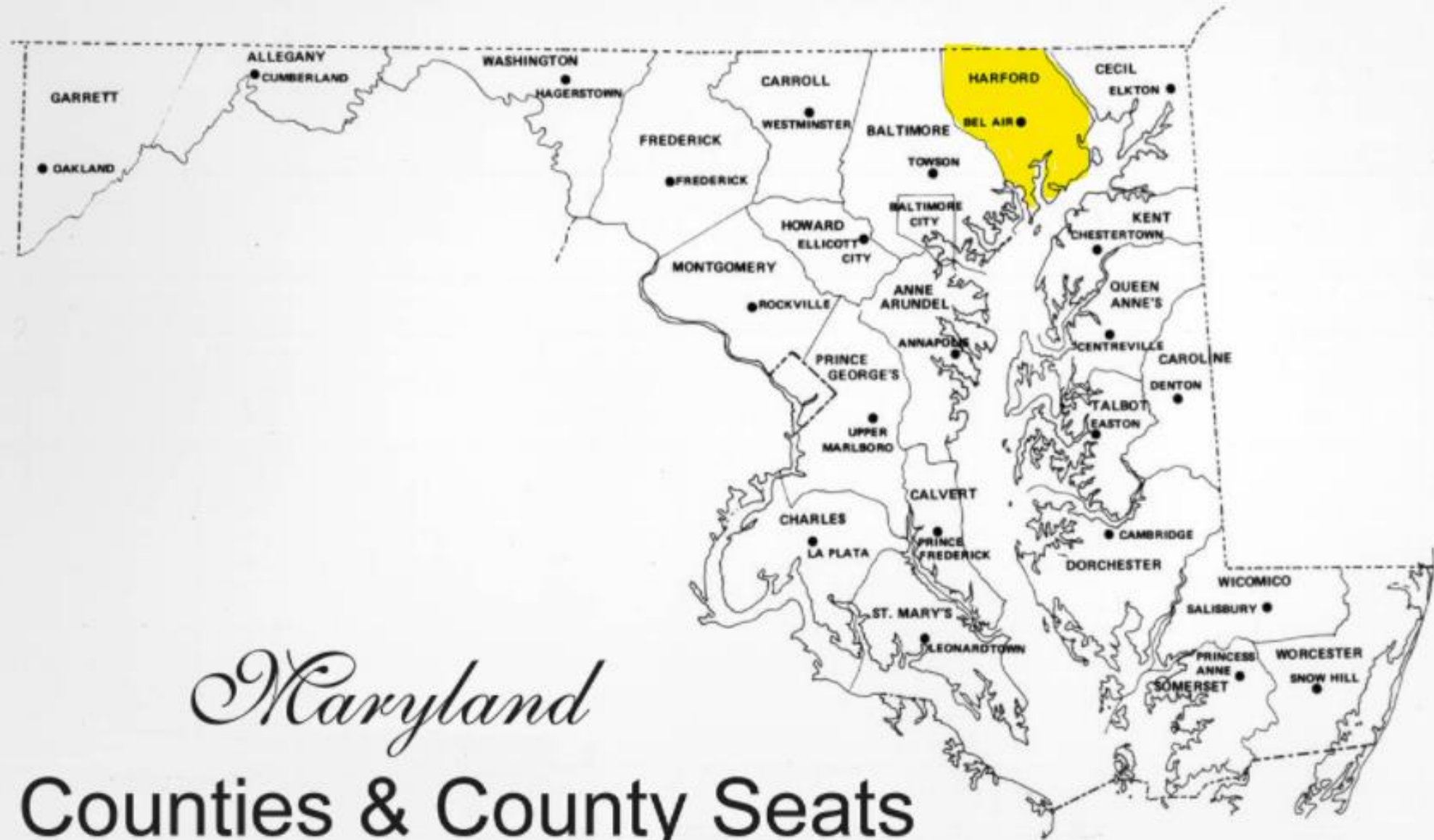


Salt Brine Environmental Stewardship- Harford County Experience

Steve Walsh – Harford County DPW

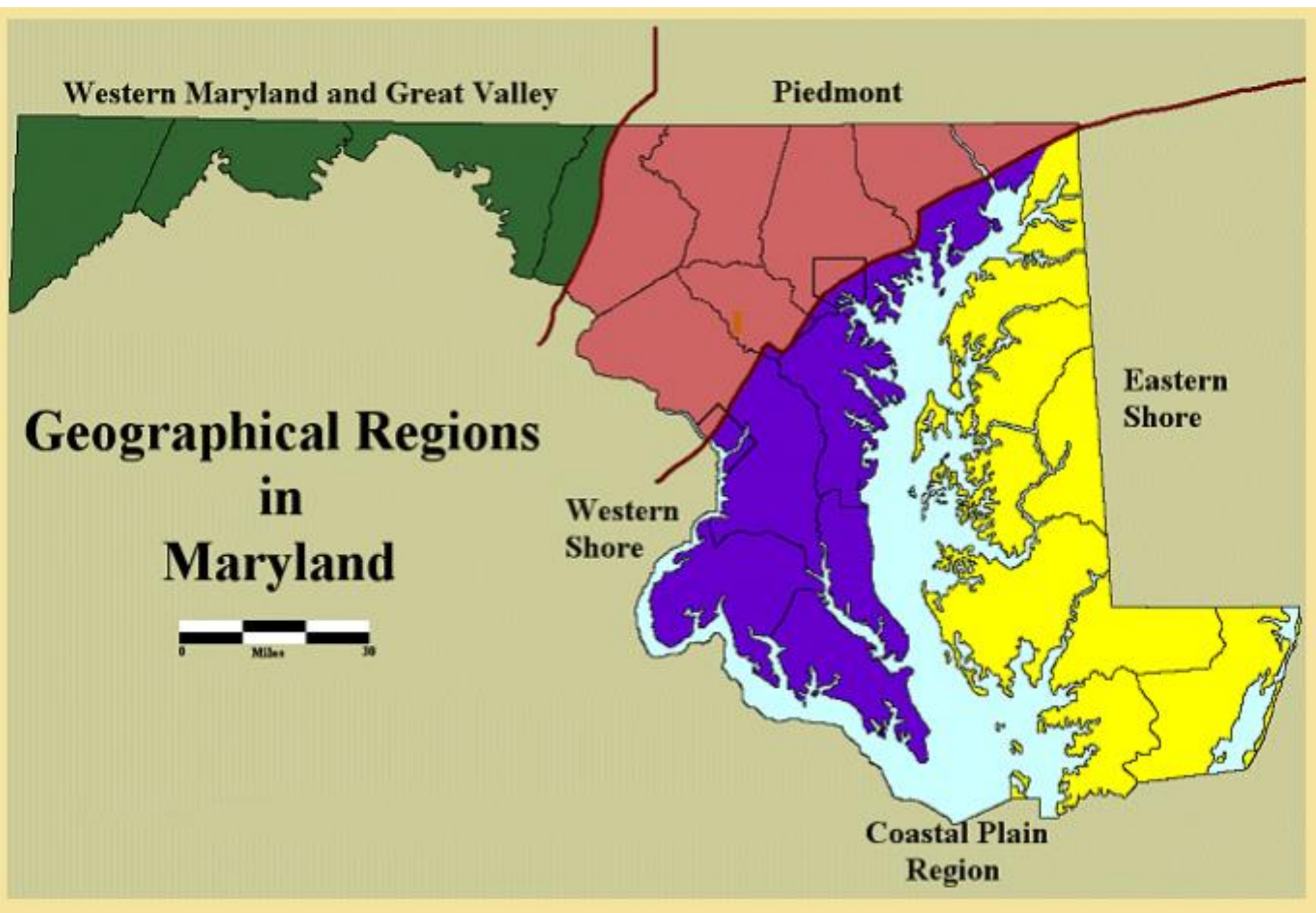
April 15, 2022





Maryland

Counties & County Seats



Harford County Snowplow



FAST FACTS



WE MAINTAIN

1,078

Miles of Road



1,246

Courts

Seventy-five Routes

67

Regular



8

Emergency



150

Pieces of
Snow Removal Equipment

20,000

Tons of Salt Stored



195

Employees

QUESTIONS OR COMMENTS?

CONTACT US:



Need to report an issue?

Use our "You CLICK We FIX"
app to report issues any
time of day or night:

harfordcountymd.gov/YouClickWeFix



HARFORD COUNTY
Department of Public Works
Highways Division



410-638-3279



212 S. Bond Street, Bel Air, MD 21014



harfordcountymd.gov/highways

HARFORD

COUNTY

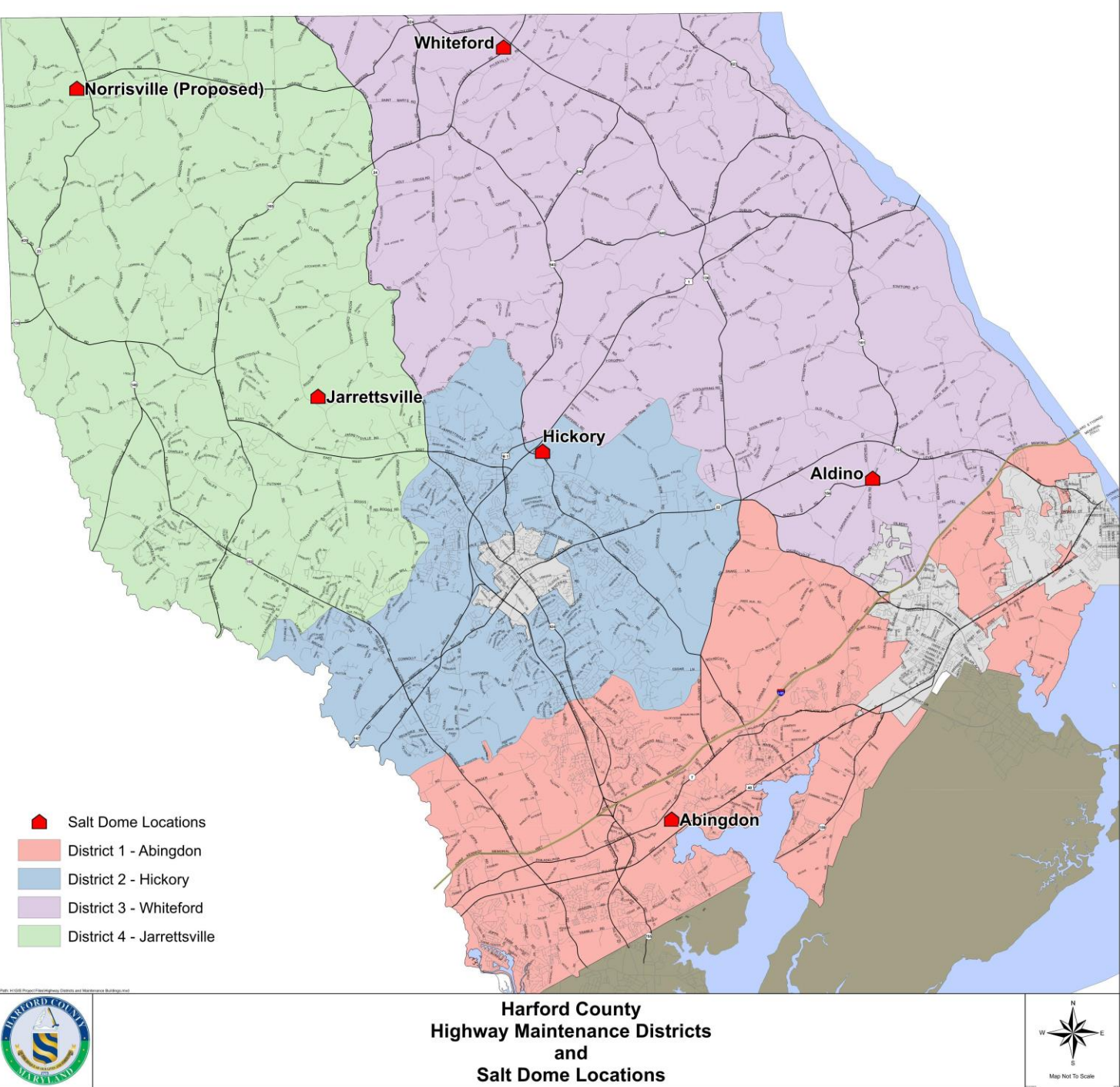
PUBLIC WORKS

SNOW REMOVAL GUIDE



Director Joseph J. Siemek, PE
Deputy Director Steven Walsh, PE

Barry Glassman, Harford County Executive



686 miles- Asphalt
351 miles- Tar & Chip
42 miles- Earth

1079 - C/L Miles

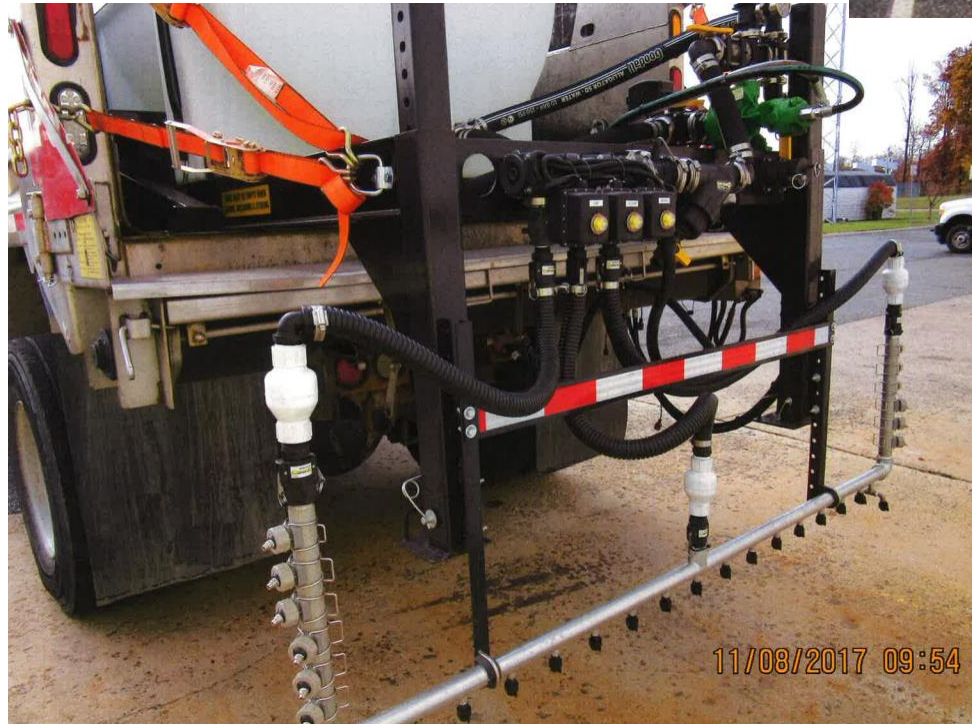
2017



- 2 - 5500 gallon double wall storage tanks
\$42,000

- 4 Port City Applicators with 1000 gallon insert

\$100,000



- Henderson BrineXtreme Mobile trailer

\$135,000



Pretreatment

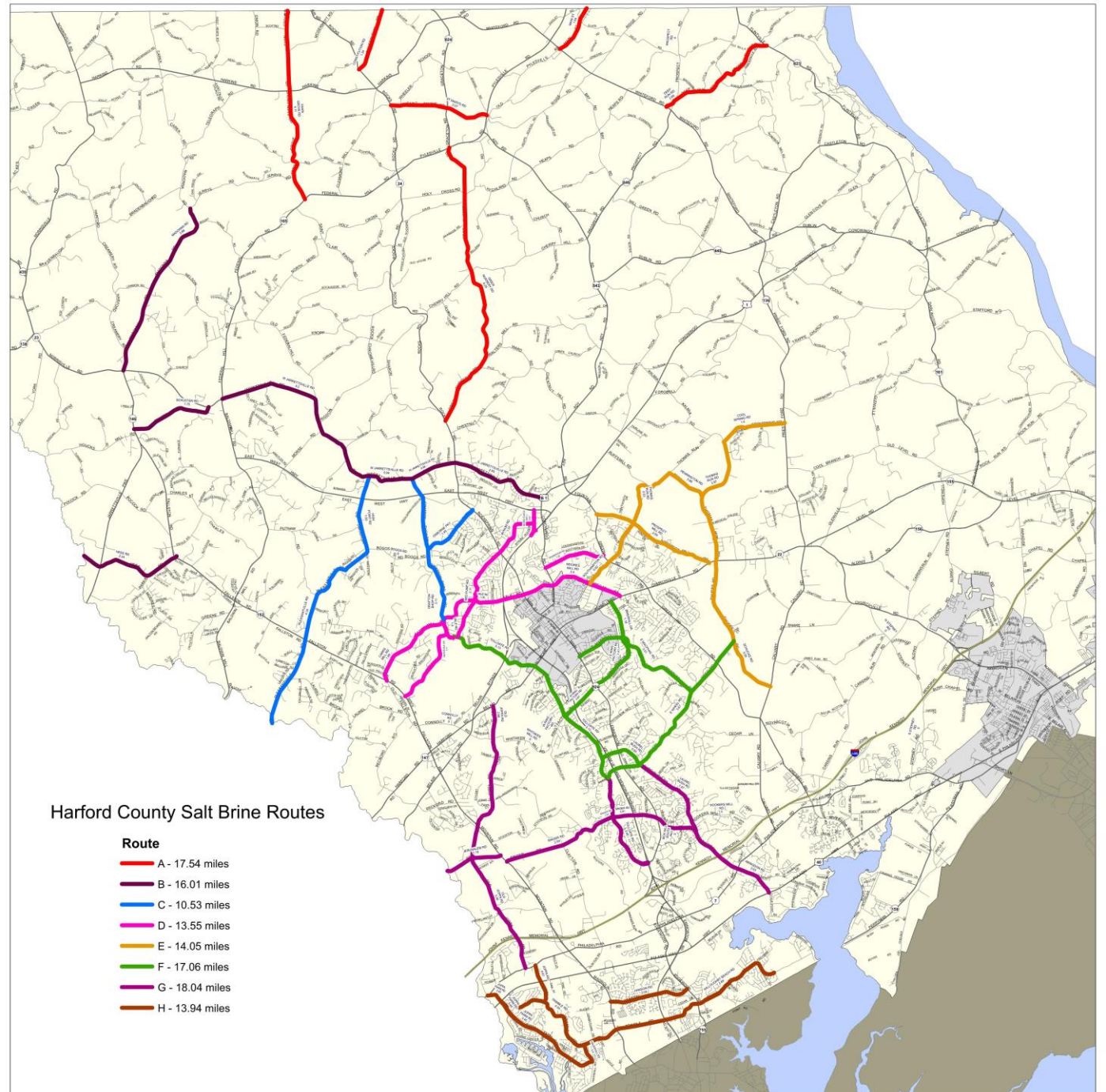


- Pretreatment routes 241 miles
- 40 gallons per mile requires 9700 gallons
- Avg 2.42 lbs of salt /gallon of brine
- 23.3 % concentration
- < 30 MPH



Brine Routes for pretreatment

* Emergency Routes
and some Main Routes

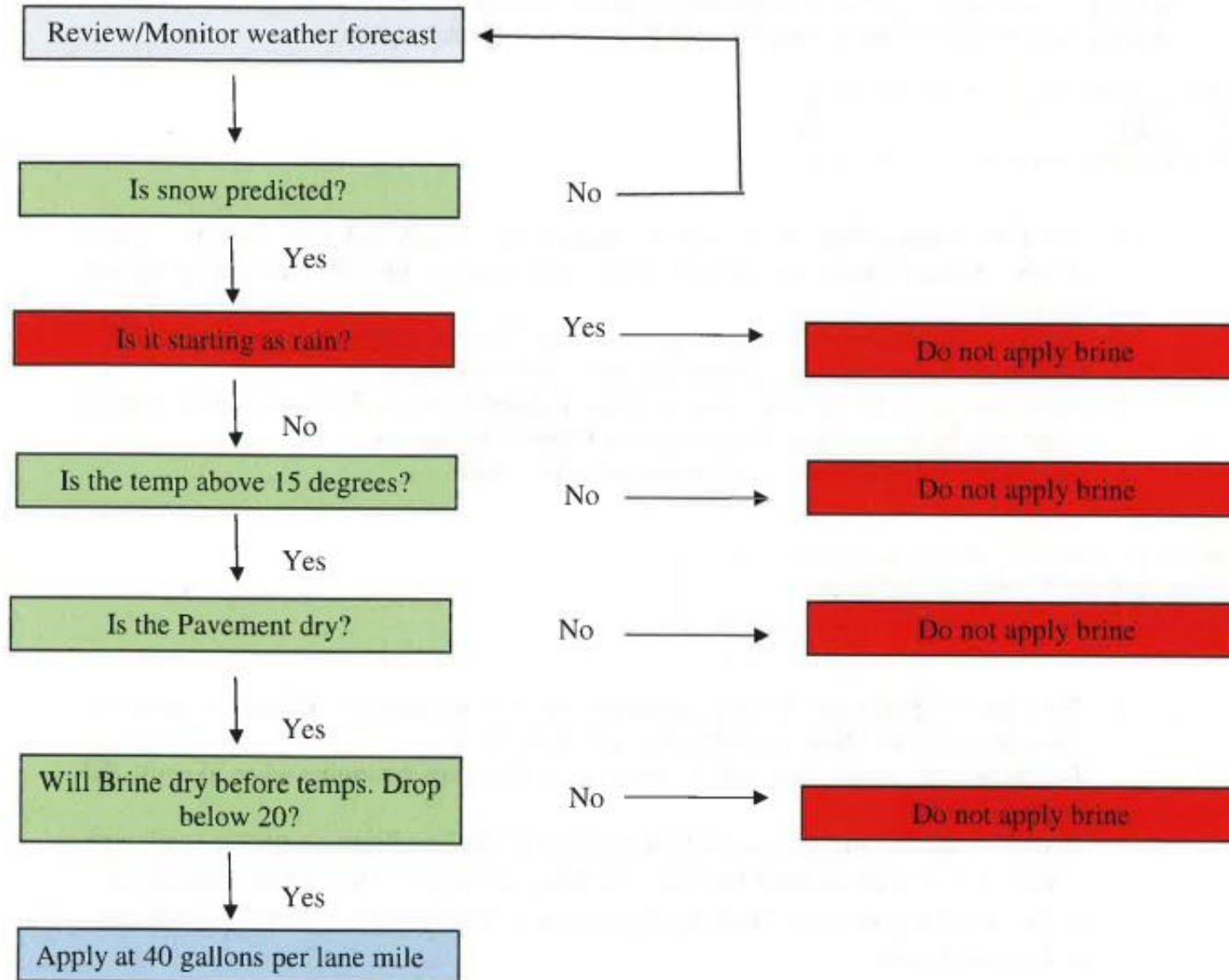


K. BRINE APPLICATION

Standard Operating Procedure

1. The Chief of Highways & the Superintendents will monitor the weather to determine when to apply Salt Brine to emergency and main routes.
2. The Brine application chart will be used as a tool to help determine when to apply Salt Brine to roads.
3. Each District will supply a trained driver to apply the Salt Brine. A pickup truck with a driver will also be required to follow the brine applicator. The pickup truck should be the oldest in your area. Warning Signs should be mounted on the dump truck and pick up truck used.
4. We have four applicators; each will be responsible for (2) routes. They will apply Brine at a rate of (40) forty gallons per lane mile. It must be applied at a speed of 30MPH or less. Brine applied at speeds greater than 30MPH will not disperse the proper amount.
5. Drivers must clean the trucks and equipment after they have completed their routes.
6. Roads that are treated with Brine must be monitored by Route Checkers to determine its effectiveness. This information will be relayed to the Chief of Highways & Superintendents through there District Supervisor.

Brine Application Decision Chart





Pretreated



NOT Pretreated



Pretreatment

- 2018 - 4 events
- 2019 - 6 events
- 2020 - 1 events
- 2021 - 3 events
- 2022 - 3 events



Savings over 5 years

\$23,753

351 tons (702,000 lbs) **less salt**



2018 Move towards prewetting systems



4 – Varitech saddle tank prewet systems for tri axles

2 – Varitech saddle tank prewet systems for single axles



Prewetting

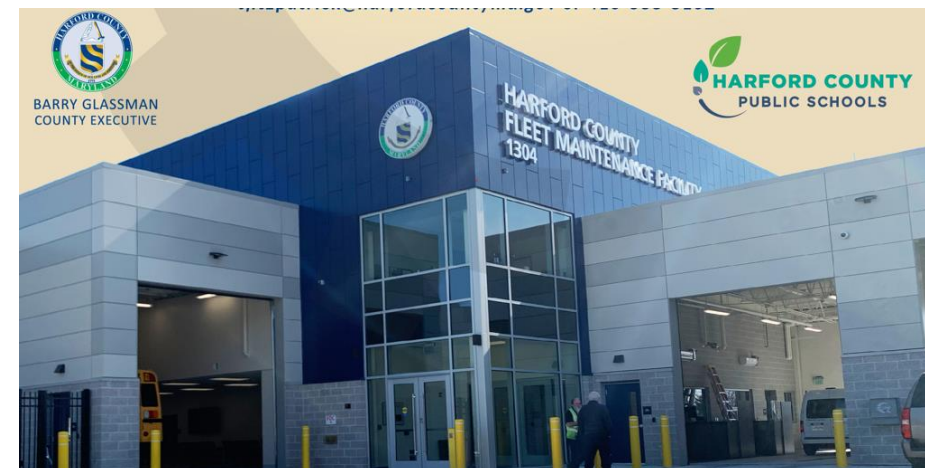
- 3 gallons brine/ton of salt
- 200 lb salt per lane mile
- Faster action

Brine usage – Buy in

- Administration
- Staff
- Public

Equipment maintenance

- One staff driver of brine unit
- Organization Culture



Harford County Wins Award for Fleet Operation

👤 Alex Butler - 🕒 May 17, 2021 - 📁 County News / Transportation and Public Works

Harford County's fleet operations unit has been named one of "The 100 Best Fleets" by the National Association of Fleet Management.

Harford ranked 42nd and ensured that Maryland was represented in the top 100. Fleet operation units were judged on their use of technology, performance, collaboration, service turnaround time and accountability.

Harford County's fleet operations unit is responsible for more than 1,000 pieces of equipment, including sheriff's vehicles, public works trucks, and more.

For the full list of 100 best fleets, visit the association's [website](#).

Share this:



39	Cobb County, GA (tie)
39	City of Dublin, OH (tie)
40	The Port Authority of New York and New Jersey
41	City of Riverside, CA
42	Harford County, MD
43	Dakota County, MN Fleet Management
44	Dallas County, TX
45	State of Delaware
46	City of Round Rock, TX

NEUTRO-WASH™
Salt and Chloride Neutralizer

BENEFITS

- ✓ Completely neutralizes and removes salt, salt brine, calcium chloride, and mag chloride that is left behind after normal washing with soap and water.
- ✓ Fast acting. It only takes 2 to 3 minutes to decontaminate your deicing fleet and equipment.
- ✓ Extremely economical, dilutes 1 to 6 with cold water. It only takes about 2-gallons of diluted product to completely neutralize a tandem axle truck.

Watch a NEUTRO-WASH™ Video at www.rhomar.com

NEUTRO-WASH™ is the first line of defense against rust and corrosion damage. It does what soap and water cannot do, REMOVES the corrosive white salt residue from your fleet.

ARMOUR-SEAL™
Industrial Strength Undercoating

BENEFITS

- ✓ Easy to apply. No mixing. Simply use your air compressor and RHOMAR's PISTOL-GRIP Spray Gun and you are ready to go.
- ✓ Safe to use. No hazardous solvents, non-flammable and low VOC's.
- ✓ A little goes a long way. For long lasting protection, it only takes 4 to 6 quarts to treat a tandem axle truck.

Watch a ARMOUR-SEAL™ Video at www.rhomar.com

ARMOUR-SEAL™ is an industrial grade undercoating that your crew can easily apply in your own shop. It is easy to protect your truck frames, oil pans, fuel tanks and other undercarriage components from the devastating effects of salt and liquid deicers used on roads today.

Harford County Draft MS-4 Permit

March 11, 2022

“The County shall reduce the
use of winter weather deicing
and anti-icing materials...

Why use brine?

- Environmental benefit of reduced salt usage
- Better service
- Best practice
- Legal



Next for Harford County

- Brine storage tanks at each shop
- Future trucks with saddle tanks and prewet system (10 ton single axle)
- New facility in Norrisville



Brine usage – Encouraging Excellence and Lessons Learned

- Start small, then expand
- Maintain the equipment
- Continuous data tracking and operation improvement

IN CLOSING...

- Continued internal and external partnering
- Continued research into resource alternatives
- Brine does work but there is more to it...

Questions?

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