

DTS polymer technologies are the answer for solidification and encapsulation of radioactive, hazardous, and mixed wastes, to provide a long-life barrier against environmental release.

DTS is the only supplier of these patented solidification processes. We have applied them in containers from 55-gallon drums to 200 cubic foot carbon steel liners.

Vinyl Ester Resin In Situ (VERI™) and Vinyl Ester Styrene (VES) solidification processes are the **subjects of NRC-approved Topical Reports for stabilization of Class A, B, and C wastes, in compliance with 10 CFR 61.**

NRC approval makes VERI™/VES the best choice for preparing wastes for interim on-site storage. Also, because NRC-approved waste forms have been accepted by all proposed regional compacts, users can save the time, expense, and exposure of handling and reprocessing wastes.



**Polymer-solidified Waste Samples**

NRC approval of VERI™ filter encapsulation makes this process ideal for solidifying filters in liners backfilled with ion exchange resin. The advantages include packaging efficiency, filter activity averaging, and elimination of the need to re-dewater stored waste before disposal.

## Advantages of Polymer Solidification

### Regulatory Approval

- Only solidification method with NRC-approved Topicals for stabilization of Class A, B, and C wastes
- Accepted by all US commercial low-level waste disposal sites

### Volume Efficient

- VERI™ produces zero volume increase
- VES has 2 to 1 waste to media ratio

### Improved Waste Form

- Compressive strength 5-10 times cement
- Leach index up to 10,000 times cement

### Controlled and Consistent

- PCP determines media formulation
- Reliable translation bench- to full-scale

### Chemically Tolerant

- Tolerates wide waste pH range
- Unaffected by sulfates, nitrates, ammonia

### User-Friendly

- Portable, skid- and trailer-mounted
- Reliable, low-maintenance operation

### ALARA

- Shielded to minimize exposure
- Remote operation and control
- Video monitored

### Economical

- Low capital equipment cost
- No HIC or burial overpack required
- Reduced waste volumes save cost of containers, transport, and burial

Vinyl Ester Resin In Situ (VERI™)	Vinyl Ester Styrene (VES)
<p>This process solidifies and encapsulates materials <b>without mixing</b>.</p> <p>VERI™ is excellent for solidification of coarse or granular materials with easy-to-penetrate interstitial spaces.</p> <p><b>VERI™ Applications</b></p> <ul style="list-style-type: none"> <li>• ion exchange bead resin</li> <li>• spent LOMI/CITROX bead resin</li> <li>• zeolites</li> <li>• filter elements (encapsulation)</li> <li>• hardware pieces (encapsulation)</li> <li>• metal pieces (encapsulation)</li> <li>• swarfs (encapsulation)</li> </ul> <p><b>The VERI™ Process</b></p> <p>In the VERI™ process, waste is placed into a carbon steel storage/disposal liner fitted with dewatering internals, then dewatered through a fillhead.</p> <p>VERI™ media is mixed in a separate tank, then pumped into the dewatered liner through a fillhead. Media flows through the waste, coating each particle, filling spaces and displacing water and air. The media forces any remaining water to the low point of the liner, where it is pumped away.</p> <p>In encapsulation of filters and hardware, spaces between the materials let media flow to the bottom of the container. The container fills from the bottom; air is pushed ahead of the media up and out of the container. The low viscosity of the VERI™ media allows it to penetrate voids and crevices easily.</p> <p>After VERI™ media is introduced, solidification in the storage/disposal container progresses without further intervention. Bead resin solidifies to a shippable product in 2-3 hours. Encapsulated filters are ready to ship in 1 hour. Solidification is confirmed by temperature readout.</p>	<p>This process involves high-shear mixing of polymer with waste materials.</p> <p>VES is ideal for wet/liquid wastes, powdered/granular wastes, and other material that lacks easy-to-penetrate interstitial spaces.</p> <p><b>VES Applications</b></p> <ul style="list-style-type: none"> <li>• evaporator concentrates</li> <li>• sludges, resin slurries</li> <li>• chelated decon solutions</li> <li>• carbon filtration media</li> <li>• powdered ion exchange media</li> <li>• filter aids</li> <li>• incinerator ash</li> </ul> <p><b>The VES Process</b></p> <p>In VES processing, waste is mixed into solidification binder in a continuous mixer or a waste container.</p> <p>The high-shear mixing encapsulates liquids and/or solids into the vinyl ester binder. Liquids are broken into low micron range droplets; solids are also finely dispersed.</p> <p>This permits the solidified material to pass TCLP testing. Typically, loadings of 60-70% by volume and 60-80% by weight can be achieved.</p> <p>Processing can be done using a continuous mixer (which can transfer the material to any container), or on a batch basis (in drums or smaller containers) using a high-shear mixing blade. DTS can provide remotely operated systems for both applications.</p> <p>Class B and C wastes have been encapsulated using a remotely operated drum solidification system that mixes the waste in pre-filled binder drums, monitors the exotherm, tests hardness, checks the drum for water, caps and weighs the drum, and smears the exterior for contamination.</p>