



SOLIDIFICATION/STABILIZATION APPLICATIONS

Include but not Limited to:

- Solidification of hazardous aqueous slurries
- Nuclear waste solidification
- Storm pond solidification
- Tunneling muck solidification for transport
- Bio hazardous waste solidification
- Directional drilling mud
- Mine tailings
- Daylighting and vac truck solidification
- Municipal sewage waste lagoon solidification
- Dredged sludge/mud stabilization and solidification
- Tank bottoms slurries
- Wet slurries from inefficient wastewater treatment
- Wet slurries from inefficient dewatering equipment
- Small wastewater volume with high concentrations of solids, heavy metals, high surfactants
- Cleanup of spills from polymer, paint, ink, adhesives



WHY CHOOSE



?

Product Lines Capable of

- ✓ Solidifying slurries into landfill-accepted solids quickly
- ✓ Passing TCLP, Slump, and Paint Filter Tests
- ✓ Absorbing up to 250x its weight in water
- ✓ Minimally impacting waste volume after product/treatment addition





STABILIZATION/SOLIDIFICATION

RNR's high efficiency absorbing agents are ideal for the absorption and solidification of slurries or high-solids wastewaters. Containing organic and inorganic components they rapidly absorb and retain large volumes of aqueous matter **turning liquid into a solid that passes paint filter and slump tests.** Solids generated are often **non-leachable and pass TCLP.** (can depend on certain chemicals present in your waste stream)



Latex flowing through feeder mounted to dump cart



Solidified Tire cord latex





STABILIZATION/SOLIDIFICATION

These products ensure compliance with federal, state and local disposal standards while offering a more cost-effective and safer approach than lime, fly ash, diatomaceous earth or other traditional absorbents.

- **Economical disposal solution**
- **Proven results – ensures compliance**
- **Converts liquid to solid in minutes**
- **Operates on a wide range of pH**
- **Non-exothermic**
- **Some products require no mixing because of unique wicking action**
- **Some products set up in less than two minutes**
- **Treats solids to pass all the following tests:**
 - Paint Filter Liquids Test (EPA 9095)
 - Slump Test – CSA Test Method A23.25C
 - Liquid Release Test (LRT) Procedure (EPA 9096)
 - Toxicity Characteristic Leaching Procedure (EPA 1311)
 - Leachable BTEX (benzene, toluene, ethyl benzene and xylenes)
 - Solids meet Class II Landfill Criteria



ESTIMATING DOSAGE FOR SOLIDIFYING/STABILIZING AGENTS

PRODUCT	APPLICATIONS	SOLIDIFYING / STABILIZING AGENT DOSAGE RATE (GRAMS)		
		LOW	MEDIUM	HIGH
SORBOND UP	all-purpose powder	10	20	30
SORBOND UG	all-purpose granular	10	20	30
SORBOND LPC II	high metals	20	30	40
SORBOND ES	paint or other sticky wastes	10	20	30
SORBOND LOC 40	organic/oily waste w/metals	10	20	30
LIQUISORB 200	high water content wastes	1	5	10
LIQUISORB 1000	organic and oily wastes	5	10	15
LIQUISORB 2000/ 2000G	high water content w/metals or other contaminants	2	8	14

1. Using the above chart, identify products of interest for your specific waste.
2. Label three plastic cups as “low”, “medium” and “high”. Fill each one with 100 grams of waste to be solidified.
3. Using the above chart, add the appropriate amount of product to each cup. Stir. Allow cups to sit for 12-24 hours before recording results. A successful dosage should yield sludge with no free liquid.
4. Repeat as necessary, with varying dosage rates. If none of the samples set-up, use more product and/or consider another product. If the lowest dose is successful, repeat test, but add less product. The resulting gram dosage is equal to pounds of product required per 100 pounds sludge (i.e. a 10 gram dose equals 10 lbs. per 100 lbs. sludge).

STABILIZATION/SOLIDIFICATION



Apply Absorbent



Mixing with Long Reach



Place in Roll-off for Disposal

Multiple options for: STABILIZATION/SOLIDIFICATION

DESCRIPTION	FUNCTION
Super Absorbent Media	Solidification of aqueous matter, increases volume by less than 1%
Super Absorbent and Adsorbent Media	Solidification of aqueous solutions and semi solids containing organic matter
Clay-Based Absorbent Media	Solidification of aqueous matter and drilling fluids with low to high solids
Clay-Based Absorbent Media	Solidification of general wastes ranging pH 2-12
Clay-Based Absorbent Media	Solidification/Stabilization of wastes containing heavy metals
Clay-Based Absorbent Media	Solidification/Stabilization of wastes containing organics





STABILIZATION/SOLIDIFICATION

SORBOND® UP/UG

Up to 25% more efficient than DE, fly ash, and other traditional absorbing agents.

- Effective on variety of waste streams with pH 2-12.
- Non-biodegradable.
- Non-exothermic.
- Enhances de-watering of solids and helps treated solids pass Paint Filter Test (EPA 9095).
- Available in powder (UP) and granular (UG) form.
- Minimal humidity effects.

LIQUISORB® 200

Highly efficient media for stabilization of aqueous matter.

- Capable of absorbing up to 250x weight in water.
- Less than 1% free swell.
- Non-biodegradable.
- Non-exothermic.
- Helps treated solids pass Paint Filter Test (EPA 9095) and Liquid Release Test (9096).
- Requires no mixing – sets up in less than 2 minutes.
- Certified incinerible material with heat value of 5560 BTU/lb.
- Strong ion exchange capability allows for some heavy metals to be bound to wastes.





STABILIZATION/SOLIDIFICATION

LIQUISORB® 1000

Highly efficient media for stabilization of aqueous matter containing hydrocarbons.

- Non-biodegradable.
- Non-exothermic.
- Helps treated solids pass Paint Filter Test (EPA 9095) and Liquid Release Test (9096).
- Requires mixing – sets up in less than 2 hours.
- Strong ion exchange capability allows for some heavy metals to be bound to wastes.

LIQUISORB® 2000/2000G

Chemically fixates heavy metal bearing wastes, stabilizes hydrocarbons and other organic and inorganic material while minimizing total solids volume.

- Helps treated solids pass Paint Filter Test (EPA 9095) and Liquid Release Test (9096).
- Helps solids pass Toxicity Characteristic Leachate Procedure (EPA Method 3015).
- Require mixing - sets up in 24—72 hours.
- Offers low dosage and actual reduction of weight and volume.
- Low exothermic reaction during treatment.





STABILIZATION/SOLIDIFICATION

SORBOND® LPC II

Chemically fixates heavy metal-bearing wastes, while minimizing total volume of the resulting solids.

- Helps treated solids pass Paint Filter Test (EPA 9095) and Liquid Release Test (9096).
- Helps solids pass Toxicity Characteristic Leachate Procedure (EPA Method 3015).
- Require mixing - sets up in 24—72 hours.
- Offers high compressive strengths for solidified matter.
- Low exothermic reaction during treatment.

SORBOND® LOC

Chemically fixates heavy metal bearing wastes, stabilizes hydrocarbons and other organic and inorganic material while minimizing total solids volume.

- Helps treated solids pass Paint Filter Test (EPA 9095) and Liquid Release Test (9096).
- Helps solids pass Toxicity Characteristic Leachate Procedure (EPA Method 3015).
- Require mixing - sets up in 24—72 hours.
- Offers high compressive strengths for solidified matter.
- Low exothermic reaction during treatment.



SOLIDIFICATION TECHNIQUES



BROADCASTING/ADD-MIX



BETTER THOROUGH-MIXING

LOWERS MATERIAL USAGE



Biosludge Solidification Example

Using Standard Solidification Products:

50%
ADDITION
RATE

\$56,006
WEEKLY
COST

24 HOUR
CURE
TIME

Using RNR ENVIRONMENTAL Products

0.7%
ADDITION
RATE

\$39,240
WEEKLY
COST

2 HOUR
CURE
TIME





Biosludge Solidification Example

Width	Length	Depth	Cubic Feet	Gallons per Cubic Ft	Total Gallons	Pounds per Gallon	Total Pounds	Percent to Complete	Pounds to Solidify	Solidification Product Rate	Pounds of Product
190	1000	8.5	1,615,000	7.481	12,081,815	10	120,818,150	60%	72,490,890	0.7% RNR	507,436
										1.4%	1,014,872
									competitor product	50%	36,245,445

With .7% added volume and super fast reaction time
 No one can beat RNR's cost savings!



Biosludge Solidification Example



First Trial – Roll Off Box

Biosludge Solidification Example



Second Trial – Four 2,000 Bulk Bags

Biosludge Solidification Example



Second Trial - **Mixing**

Biosludge Solidification Example



Second Trial - Loading

Biosludge Solidification Example



Full Scale

SUCCESS STORY



CLEAR SOLUTIONS
for complex fluids

Solidification: Cost Reduction

CHALLENGE

- Behind schedule, over budget

SOLUTION

- Low dosage rate, fast cure time

RESULTS

- Cost savings in overall project from start of bio-solid lagoon to final landfill destination producing solids that pass paint filter test.

RNR ENVIRONMENTAL

Wastewater - Solidification SUCCESS STORY

Solidification: Cost Reduction

CHALLENGE

Solidification project was over budget and behind schedule. Calciment was being used at 46% addition rate and needed to set for a full day due to exothermic reaction. Of the 630,000 pounds going to landfill daily, only 430,000 pounds were of bio-solids from the lagoon. Often, on-site 24-hour cure time resulted in solidified bio-solids getting rained on and needing to be re-solidified. High dusting from the Calciment necessitated daily washing of nearby equipment.

SOLUTION

After evaluating the characteristics of the project, CETCO opted to apply its proprietary LiquiSorb® product, believing that this would allow for much lower addition rates, faster cure time, lower dusting, and no exothermic reaction.

RESULTS

The application of LiquiSorb® allowed the customer to finish the project under final budget and on schedule. The addition rate was able to be lowered from 46% to 0.7%. Lower dusting eliminated the need to wash equipment every day. Cure time fell from 24 hours to 2 hours, with no exothermic reaction. CETCO's treatment allowed the same 45 truckloads going to landfill per day to increase removal of actual bio-solids from 430,000 pounds to 620,000 pounds.



RNR ENVIRONMENTAL



Paint Sludge Solidification

Total Gallons	Pounds per Gallon	Total Pounds	Liquisorb® Product	Solidification Product Rate	Pounds of Product	Cost per Pound	Solidification Cost
25,000	10	250,000	LiquiSorb® 50	0.8%	2,000	\$1.50	\$3,000
			LiquiSorb® 200	0.6%	1,500	\$2.50	\$3,750





Power Plant Solidification

Cubic Yards	Gallons per Cubic Yard	Total Gallons	Pounds per Gallon	Total Pounds	Liquisorb® Product	Solidification Product Rate	Pounds of Product	Cost per Pound	Solidification Cost
5,000	202	1,010,000	10	10,100,000	LiquiSorb 50	1.0%	101,000	\$1.20	\$121,200
1,000	202	202,000	10	2,020,000	LiquiSorb 50	1.0%	20,200	\$1.20	\$24,240





RESEARCH AND TESTING

RNR ENVIRONMENTAL Research and Testing Laboratory performs a wide range of instrumental and wet-chemical analyses using state-of-the-art analytical equipment. Some of the laboratory's capabilities include:

- **Total Suspended Solids (TSS)**
- **Fat, Oil and Grease (FOG)**
- **ICP Metals Analysis**
- **Total Organic Carbon (TOC)**
- **Chemical Oxygen Demand (COD)**
- **Toxicity Characteristic Leaching Procedure (TCLP)**
- **Atomic Absorption (AA)**
- **X-Ray Diffraction (XRD)**
- **X-Ray Florescence (XRF)**
- **Thermo-Gravimetric Analysis (TGA)**

