

Summary of Federal Affirmative Procurement of Post Consumer Recycled Glass Abrasives



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FINAL

Prepared for:

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1.0 BACKGROUND

For the continued viability of glass recycling, large volume new markets for recycled glass must be developed, since most recycling communities have reached or exceeded their region's capacity for recycling glass to bottle and fiberglass plants. In terms of value added and volume potentials, the only promising market for glass is abrasive blasting media. The volume is large enough to allow glass to compete. The economics are challenging, with processing costs in the \$40-70/ton range and potential revenues of \$85-90/ton. Abrasive media should be considered a "base load" market for any other market contemplated for finely ground glass. The other identified markets for glass – filtration, fillers, textures, flooring, specialty sands, etc. – are far smaller markets and not viable in and of themselves.

The fact that mixed colors of glass can be used in abrasives is truly significant. The current trends in recycling programs to co-mingle all colors of glass in collection, the increased use of optical sorting systems in recycling processing plants, and the tightening specifications for color sorted glass at bottling plants are producing even larger quantities of unmarketable mixed color glass. Most other promising market applications for recycled glass cannot tolerate mixed colors of glass, nor the levels of contamination that go along with the stream.

1.1 The Role of the Federal Government

The federal government directly and indirectly controls the major portion of the abrasive blasting market. It purchases abrasive media in large quantities at its facilities at shipyards, dams, military bases and depots. It contracts for abrasive blasting services in hundreds of locations nationwide. It writes abrasive blasting specifications that are not only followed in federal and federally contracted projects, but they are also used in state and local government projects.

2.0 THE UNIQUE PROPERTIES OF GLASS AS AN ABRASIVE

A wide range of materials is used for surface preparation. Expendable abrasives, including coal, copper and nickel slags; and mineral abrasives such as silica sand, staurolite, and specular hematite, are commonly used for larger scale projects such as ships, tanks, bridges, etc. Other abrasives, including aluminum oxide, plastic, steel grit and shot, glass bead and walnut shells are used (and often re-used) for specialty applications such as parts cleaning, surface preparation in manufacturing, and other uses. Ground glass has properties and features that allow it to compete favorably in both arenas:

Sharp, angular particles	<i>Yet, glass is still safe for handling and loading.</i>
Aggressive profiling	<i>A 16/30 grit at 80 psi can deliver a 4 to 4.5 mil profile.</i>
Excellent coating removal, especially difficult or thick coatings	<i>Especially well suited for removing epoxy, alkyds, vinyl, polyurea, coal tar, and elastomerics</i>
Uncommon consumption efficiency	<i>Contractors regularly report using 30 to 50% less media than slag and mineral abrasives.</i>
No free silic	<i>A major industrial hygiene difference, as OSHA continues to warn about the carcinogenic and silicosis risks of exposure to silica dust.</i>
No heavy metals	<i>In stark contrast to the extraordinary level of hazardous health-related agents found in slag and mineral abrasives (See NIOSH report <u>Evaluation of Substitute Materials for Silica Sand in Abrasive Blasting</u>, Report PB99105553 at http://www.cdc.gov/niosh/pdfs/ab_p3rep.pdf with its data tables at http://www.cdc.gov/niosh/pdfs/ab_p3rep.pdf</i>
No chlorides, low conductivity & embedment	<i>Significant benefits in corrosion control are seen with the inert, clean nature of glass.</i>
Lighter weight	<i>Allowing for minimal substrate damage, and cost savings in freight, handling, clean-up and disposal.</i>

2.1 Breakthroughs at Federal Facilities

This project sought to educate federal facilities about the background and uses for post consumer recycled glass abrasives and to ask for use and specification of the new media. While the project met with considerable resistance, there were several success stories worth mentioning.

Cleaning fuel storage tanks at the Manchester Fuel Depot (WA) and Eielson Air Force Base (AK), Interstate Coatings of Seattle, WA found beneficial increases in productivity (15-20%) and significant decreases in consumption (33% – 50%) compared to the nickel and copper slags previously used.

A Kent, WA manufacturer of post consumer recycled glass abrasives, TriVitro Corporation, was granted the first Qualified Product Listing by the U S Navy under its specification, MIL-A-22262B(SH), Abrasives, Ship Hull Blast Cleaning.

Concrete at a newly constructed chemical weapons incinerator at Umatilla Army Depot (OR) was blasted with ground glass. Long Painting and Raytheon contractors found clean, exacting results on the concrete. For unique demands for worker safety and environmental protection, the lack of both heavy metals and free silica qualified glass for use.

The Marine Corps Logistics Base in Barstow, CA has replaced plastic media with recycled glass in one of their four blasting rooms. Glass has proven to be faster and more cost effective in removing CARC coatings and rust, while still preserving mixed substrates of the various military hardware maintained there.

The Bureau of Reclamation's facility at the Grand Coulee Dam, WA has used recycled glass abrasive successfully for removing vinyl coatings and primers from dam gates and parts. Of special interest was the cleaner, brighter surface conditions left on steel and concrete, as opposed to the gray residue left by the previously used copper slag.

Scott Air Force Base (IL) was the first federal facility to require the use of recycled glass abrasives in a service contract, in this case for five years of base maintenance services. Post consumer recycled glass abrasives carry multiple benefits of meeting Air Force and federal requirements for Affirmative Procurement, Pollution Prevention, waste reduction/recycling and avoidance of toxics.

Post consumer recycled glass abrasives are scheduled to be listed in upcoming EPA revised listing of Comprehensive Procurement Guidelines. With enough continued effort, product acceptance and proactive procurement in pockets of federal activity will send out ripple effects to other agencies and encourage the use of post consumer recycled glass abrasives.

Technical Data	
Specific Gravity	2.50
Density (approx.)	80 lbs/cu. ft

Hardness (approx.)	6.0 Mohs scale
Conductivity	73 micro-mho/cm
Chlorides	<.0002%
Shape	Angular to sub-angular
Embedment at 100psi	0.0% to 0.4%
Wt Change on Ignition	- 0.17%
Softening Point	Approx. 1350?

Web Site Links:

TriVistro Corporation www.trivistro.com

Universal Ground Cullet www.groundcullet.com

NIOSH report on abrasives www.cdc.gov/niosh/pdfs/ab_p3rep.pdf with data tables at www.cdc.gov/niosh/pdfs/ab_p3rep.pdf

EPA Environmentally Preferable Purchasing Programs www.epa.gov/opptintr/epp

EPA Final Guidance on Environmentally Preferable Purchasing www.epa.gov/opptintr/epp/finalguide.htm

White House Task Force on Recycling www.ofee.gov

2.2 Suggested Specification Language:

In compliance with Federal Executive Order 13101 {or insert other policy}, the contractor shall use post-consumer recycled glass abrasive media or provide written documentation for not doing so prior to beginning any work under this section.

Contractor shall use post-consumer recycled glass abrasive media to achieve the surface conditions described in section {XX.XX}.

Abrasive blast media shall be made from 100% post consumer recycled glass and be certified by the California Air Resources Board for outdoor abrasive blasting.

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Documentation, such as test results from state or federally certified laboratories, shall be submitted to show that the abrasive media meets the following criteria:

Embedment Results (ASTM D4940)	< 1.5 %
Chloride Content by weight	< 0.0005 %
Conductivity	< 80 micromhos/cm
Crystalline Silica	< 0.1%
Density	< 90 lbs/cu ft.
TOTAL Metals Content (per ICP analysis, using appropriate EPA method, such as SW 846)	
Arsenic*	< 29 mg/kg
Cadmium*	< 8 mg/kg
Chromium (VI)*	< 38 mg/kg
Copper	< 100 ppm
Nickel*	< 130 mg/kg
Lead	< 100 ppm
* U.S. EPA generic soil screening levels for migration to groundwater; values are for a 20 dilution attenuation factor	

(NOTE: In the listing of metals test result criteria above, it is important to use a TOTAL metals test, not simply a TCLP leachability (or waste designation) test. Because of the potential for environmental and worker safety risks from exposure to airborne concentrations of heavy metals or contact with more acidic groundwater conditions, total metals tests will provide better indicators for risk. Other metals such as barium, mercury, silver, or selenium, with screening for RCRA hazardous waste designation or US EPA generic soil screening levels can be added at the discretion of the specifier.)