As tipping fees have risen, interest has increased in finding alternative uses for construction wastes. Many homebuyers are also looking for environmentally sensitive building practices. This includes the recycling and reuse of construction debris rather than disposal.

One of the largest waste components in residential construction is gypsum wallboard. The National Association of Home Builders Research Center (NAHBRC) estimates scrap wallboard is 26% by weight of new home construction waste. For a 2,000 square-foot home, this equates to about 1.5 tons of material or about half a dump truck load. In many cases, scrap wallboard can be ground and beneficially applied on the construction site, rather than transported to the landfill.

Wallboard is primarily composed of gypsum (calcium sulfate) with a thin paper backing. Chemical analysis of ground scrap wallboard indicate it is very similar to mined gypsum (Table 1). Gypsum has long been used in agriculture as a conditioner to improve the physical characteristics of certain soils and a source of both calcium and sulfur for plant needs. The ground wallboard typically has more potassium and magnesium (nutrients needed for plant growth) than agricultural gypsum.

Studies of gypsum application in Georgia have shown it can be used to reduce crusting of the soil surface and increase water infiltration. Soils with clay and low amounts of calcium in the soil surface often benefit from gypsum application. In these soils, the use of ground scrap wallboard on residential construction sites can help reduce runoff and erosion by improving water infiltration.

Gypsum is a source of calcium and sulfur. Most ornamental plants and turfgrasses need these nutrients, and due to our high rainfall in Georgia, most of our soils are low in these elements. Gypsum cannot be used to raise the soil pH like lime. The calcium in gypsum does act to reduce aluminum toxicity in the subsoil. In many cases, this allows plants to root more deeply and can improve their drought resistance. Because gypsum does not dissolve quickly, salt build-up is not a problem for plants when it is applied at the recommended rates.

Table 1. A comparison of the nutrient content of ground scrap wallboard and agricultural gypsum. Data adapted from Korcak, 1996.

<table>
<thead>
<tr>
<th>Constituent (lbs/ton)</th>
<th>Ground Wallboard</th>
<th>Agricultural Gypsum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>444 - 456</td>
<td>534 - 570</td>
</tr>
<tr>
<td>Sulfur</td>
<td>320 - 328</td>
<td>402 - 424</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.4 - 0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Potassium</td>
<td>1</td>
<td>0.1 - 0.2</td>
</tr>
<tr>
<td>Magnesium</td>
<td>11</td>
<td>3.0 - 3.8</td>
</tr>
<tr>
<td>Iron</td>
<td>4.24 - 4.82</td>
<td>0.94 - 1.61</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.2 - 0.3</td>
<td>0.07 - 0.10</td>
</tr>
<tr>
<td>Boron</td>
<td>0.03 - 0.04</td>
<td>0.17 - 0.19</td>
</tr>
<tr>
<td>Sodium</td>
<td>1.8</td>
<td>1.8 - 2.0</td>
</tr>
</tbody>
</table>
Ground wallboard contains some metals, but the amounts are low compared with the metal concentration limits in the U.S. EPA Part 503 regulations for land application of municipal biosolids or sewage sludge (Table 2). These Part 503 metal limits apply only to the land application of biosolids and are used only as a point of reference. The paper backing on residential wallboard is not a source of metals based on samples of ground wallboard that were analyzed with and without paper backing.

In summary, there are many potential benefits to reusing ground scrap wallboard onsite, and there are few environmental or plant growth problems when it is applied according to recommendations.

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**Potential Benefits of Wallboard**

- Improves water infiltration and decreases potential erosion
- Provides nutrients for plants
- Can reduce aluminum toxicity in some subsoils
- Can help protect soil organic matter
- Saves tipping fees and transportation costs
- Saves landfill space

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**Potential Problems with Wallboard**

- Nutrient imbalance if overapplied
- Source separation
- Storage/scheduling
- Dust during grinding
- Paper fragments on surface if not incorporated

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**Guidelines for Use**

When you are planning to apply ground scrap wallboard on your building site, you should follow the steps listed below.

1. **Determine the application rate.**

   First, have the soil tested. You should have a routine soil test performed on soil where ground scrap wallboard will be applied. Your County Extension Agent can supply you with bags for soil sample collection and detailed information on how to take a proper soil sample. A routine analysis will tell you the soil pH, and the amounts of phosphorus, calcium, potassium, magnesium, and zinc available for plants to use.

   The application rate for the ground scrap wallboard is based on the amount of silt and clay that is typically present in the soil surface. Soils in the Piedmont, Mountains, and Ridge and Valley have more silt and clay than

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<table>
<thead>
<tr>
<th>Constituent (ppm)</th>
<th>Ground Wallboard</th>
<th>Agricultural Gypsum</th>
<th>Part 503 Table 3 ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>1,180 - 1,320</td>
<td>152 - 190</td>
<td>NR³</td>
</tr>
<tr>
<td>Arsenic</td>
<td>3.8 - 6.7</td>
<td>0.28 - 0.45</td>
<td>41</td>
</tr>
<tr>
<td>Barium</td>
<td>25.8 - 29.6</td>
<td>7.7 - 9.4</td>
<td>NR</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.4 - 1.0</td>
<td>0.05 - 1.0</td>
<td>39</td>
</tr>
<tr>
<td>Chromium</td>
<td>16.7 - 18.8</td>
<td>8.0 - 11.6</td>
<td>NR</td>
</tr>
<tr>
<td>Cobalt</td>
<td>4.1 - 4.8</td>
<td>4.0 - 4.9</td>
<td>NR</td>
</tr>
<tr>
<td>Copper</td>
<td>10.2 - 12.2</td>
<td>7.7 - 8.1</td>
<td>1,500</td>
</tr>
<tr>
<td>Lead</td>
<td>28.20</td>
<td>N/A²</td>
<td>300</td>
</tr>
<tr>
<td>Mercury</td>
<td>&lt;0.01</td>
<td>N/A</td>
<td>17</td>
</tr>
<tr>
<td>Nickel</td>
<td>3.8 - 6.7</td>
<td>0.7 - 1.0</td>
<td>420</td>
</tr>
<tr>
<td>Strontium</td>
<td>850 - 880</td>
<td>1,030 - 1,070</td>
<td>NR</td>
</tr>
<tr>
<td>Zinc</td>
<td>18.0 - 19.5</td>
<td>6.7 - 8.2</td>
<td>2,800</td>
</tr>
</tbody>
</table>

¹ U.S. EPA Part 503 Regulations, Table 3 - Pollutant Concentrations below which there are no restrictions for land application of biosolids.
² N/A - Not Available
³ NR - Not Regulated
those in the Coastal Plain; consequently, higher rates of ground wallboard gypsum can be applied (Table 3). Research has shown that nutrient imbalances due to gypsum application do not generally develop in soils high in silt and clay. High rates of gypsum application can sometimes cause a problem with magnesium in sandy soils.

Table 3. Recommended rates of ground scrap wallboard application. *Note: These weights are for dry ground wallboard.*

<table>
<thead>
<tr>
<th>Region</th>
<th>Recommended Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piedmont, Mountains, and Ridge and Valley</td>
<td>250 lbs/1000 ft²</td>
</tr>
<tr>
<td>Coastal Plain</td>
<td>50 lbs/1000 ft²</td>
</tr>
</tbody>
</table>

2. Determine if there is enough land at the site to apply all the wallboard.

**Method 1:** To **estimate** the amount of land needed.

*Table 4* provides general guidelines for the area needed to land apply wallboard for a particular size house. This table should only be used to get a general idea if land application will work for your site. In reality, the amount of scrap wallboard produced and the area available for application will vary greatly depending on the type of house built, its footprint, and the site.

**Example:**

A 2,500 square-foot house is being built on a three-quarter acre lot (32,670 ft²). Approximately 5,000 ft² of the lot will be occupied by the house and impervious areas. This means 27,670 ft² of land is available for ground scrap wallboard application. Using 1.5 lbs per square foot, construction will generate about 3,750 lbs of wallboard. Using a typical application rate (Table 3) of 250 lbs/1000 ft², you will need 15,000 ft² of land for application. Because 27,670 ft² is available for application, all of the scrap wallboard generated can be land applied.

**Proceed with the following steps, if you have enough land to apply the wallboard from a specific site.**

3. **Segregate** scrap wallboard.

Place all the clean, scrap wallboard in one location that will be accessible to the grinder. Moisture resistant or fire retardant wallboard should not be used because guidelines for land application of these products are not available at this time. Wallboard from demolition or that has been painted or wallpapered should not be used.

4. **Grind** the wallboard scraps.

Clean wallboard scraps should be ground with equipment that has a two-inch screen to make sure the paper is shredded and there are no large chunks of wallboard. Controlling dust during grinding is important. If ground wallboard will be stored before application, cover the pile with a tarp to keep the material dry and easy to handle.
Worksheet to calculate the amount of land needed to apply ground wallboard from a building site.

**Step 1: Area needed to apply wallboard.**

Formula: \[ \text{Size of the house (ft}^2) \times 1.5 \text{ lbs/ft}^2 \div \text{Recommended application rate (lbs/ft}^2) \times (\text{Table 3}) \times 1000 \]

Your Numbers: \[ \text{_________ ft}^2 \times 1.5 \text{ lbs/ft}^2 \div \text{_________ lbs/ft}^2 \times 1000 = \text{_________ ft}^2 \]

**Step 2: Existing area to apply wallboard.**

Formula: \[ \text{Size of the lot (ft}^2) - \text{Size of impervious area (ft}^2) \ (\text{Driveways, etc.}) \]

Your Numbers: \[ \text{_________ ft}^2 - \text{_________ ft}^2 = \text{_________ ft}^2 \]

**Step 3: Compare**. The number in Step 1 is the amount of area needed to apply ground wallboard from a site. If the number calculated in Step 1 is less than the number from Step 2, you have enough land to apply all the ground wallboard from your building site.

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**5. Apply the ground wallboard.**

Apply fertilizer and high magnesium dolomitic lime to the soil according to the recommendations from your soil test results. The ground wallboard should be evenly spread over the soil at or less than the recommended rate. Photographs at the right illustrate an even application at the recommended rate. The ground wallboard should tilled or mixed into four to 12 inches of soil. **Beneficial reuse does not include digging holes and burying the wallboard.**

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**Useful Facts**

- A skid loader bucket will hold about 1 yd³.
- A front end loader will hold 2-3 yd³.
- Dry ground scrap wallboard weighs about 400 lbs/ yd³.
- At a rate of 250 lbs/1000 ft², one skid loader bucket would cover 1,600 ft² (40ft x 40ft). This is an area slightly smaller than a volleyball court.
- At a rate of 250 lbs/1000 ft², about one-third of a skid loader bucket would cover the goal box on a soccer field.

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**Application Rates**

- 250 lbs/1000 ft²
- 50 lbs/1000 ft²

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**References**


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This document was supported by the University of Georgia, College of Agricultural and Environmental Sciences, Cooperative Extension Service, and the Engineering Outreach Service along with the Pollution Prevention Assistance Division. This publication was written by:

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