

September 18, 2013

Kathy Frevert, Senior Specialist
CalRecycle
1001 I Street
Sacramento CA 95812

Subject: California Carpet Stewardship Program

Dear Ms. Frevert:

The following opinions and information are a result of my experience in recycling carpet in the Sacramento area. I firmly believe in the value of all types of recycling for modern society. Based on my own encounters with local regulators, not all jurisdictions or agency staff members are committed to or interested in this important branch of sustainable economic development. I am providing this input in the hopes that CalRecycle can become more pro-active in encouraging and advocating for business people willing to invest their time, energy, and funds in the business of recycling, rather than allowing local regulators to step in and essentially prohibit participation in this state-sponsored program.

The Importance of Resource Recycling

Recycling of resources will be important until such time as technology finds a way to nullify the effects of gravity and entropy. When *Homo sapiens* first started to consumptively use the raw materials of the earth, the materials were not hard to reach. Copper was melted from the rocks around a fire. Oil rose in seeps to the surface of the earth. As the material on the surface was collected, used, and then dispersed, increasing amounts of energy were needed to retrieve them. Mines needed to be dug, and then the mines got deeper. Oil is now extracted from thousands of feet below the earth. The age of mechanization made these materials easier to obtain in mass but did not change the fundamental principle: The deeper the hole, the more energy is needed to lift resources out of the hole.

In the beginning, when demand from population was light and the materials abundant, the price of extracting the commodity had little influence on the cost of the commodity in the marketplace. As demand grows to support an increasing population and materials become increasingly difficult to extract, the price of the item reaches a tipping point at which the extraction cost becomes a major factor in the cost of the commodity. The price of oil, adjusted for inflation, was basically flat for the first hundred years of use. Now, extraction cost of oil is at \$76-\$90 per barrel, a large percentage of the \$100-\$110 sale price; as a result, the cost of a barrel of oil has increased sharply. This is also true of anything made from an oil product, most metals, and the fertilizers used to grow our food.

The economic result can be directly measured as a reduction of profit. In the 1990s, the amount of profit made by home builders was roughly one-third of the cost of producing the house. Now the profit is roughly 20%, with profits as low as 8%-12% being used by some of the major home builders. This

inevitable trend has been made fuzzy by quirks in the money supply and other economic oddities, but it remains true. A concrete plant in Elk Grove has reported similar results; profits that were at 40% in the 1980s are at 15%-20% now. Our current economic malaise is the result of the accumulation of years of gradually reduced profits, caused by the increasing costs of the basic structural materials that we use in our day-to-day lives.

Countering this trend are longer work days, increasing efficiency, and recycling. Recycling is effectively a gift to society. It is essentially finding the copper melting from the rock at the campfire again and not having to pay the gravity debt to extract it. If we do not close the loops on material usage, the prospects for our society become grim in just a couple of generations. Recycling is not just a “feel good,” “brownie points” activity. It is vital now, and in a few generations it will be life or death. I urgently hope that this is an overly dramatic, over-the-top statement, but I truly believe that economic and resource trends indicate that it is a statement of fact.

The point of this preamble is this. Recycling is inevitably a dirty, smelly business. This is especially true of carpet recycling. If a carpet recycler can be shut down because the source material is dirty and smelly, then they will all be shut down. Any jurisdiction that wants to encourage carpet recycling then will need to put up with a few complaints. That is not to say that environmental factors can be ignored. A genuine threat to the physical environment should be the only criteria that should be considered legitimate. Given the critical nature of recycling, the threat to the environment should not be supposition or aesthetics, but should be required to be based on solid evidence. As far as I know, much of the threat that has been used to date in some jurisdictions has not been substantiated. I would love to be proven wrong in this. Specifically:

Fire

DBD Sustainability perceives this as a significant but manageable risk. We did experiments regarding the risk of fire to carpet storage with several members of the El Dorado Hills Fire Department and Fire Chief Mike Lillienthal. Dry carpet was flammable. The carpet that had been collected in our stockpile absorbs water. At water levels between 15% and 20% moisture (by weight), the carpet was basically inflammable. We have a video of the fire chief trying to light the 15% moisture carpet, and it took him several minutes using a road flare to first dry a portion of the pile and then to light it.

The fire chief had several recommendations to reduce the fire risk of the pile to an acceptable level. Chief among these was to maintain a moisture level of 15%-20%. Our experience is that a water truck twice a week will do this.

Mold

In light of the fire chief’s recommendations about moisture levels, mold may seem to be an obvious concern, and it has definitely been raised by some jurisdictions as a reason for not allowing stockpiling of carpet. However, during the time that we have been watering our stockpile to a 15%-20% level (March to September 2013), mold has not been observed on carpet piles by our staff. Carpet fiber is inert and cannot be used by mold organisms for food. The toxic black mold that is the usual problem in houses grows on

cellulose, wood, or paper and not on carpet materials. There is currently no EPA standard for mold measurement and thus no justifiable standard for disallowing a business practice based on mold concerns.

Silicosis

By weight, around 60% of the material in a post-consumer, post-nylon-removal recycler pile is sand. A recycling method that separates the fiber from the sand will create large piles of mixed sand and small fiber. These piles have been considered by some jurisdictions to present a health risk for silicosis. We have no found evidence for considering this to be a significant concern.

Silicosis occurs where a strong shearing force creates a fine powder of sharp, inhalable radicals of silica minerals. A radical is an element or compound where the force was sufficient to split the sand particles and leave unpaired, highly reactive electrons behind. It occurs around blasting, high-speed grinding or oil fracking. The free electrons are very aggressive and react with something in the environment within minutes. The sand from carpet is calcium carbonate, not silica. Any silica that is present is from household dust, not from processing of the carpet. Studies show that household dust is well rounded rather than sharp and, therefore, not likely to damage the alveolar microphage in the way that asbestos or similar silica materials do. None of the sand in a carpet recycling facility has been subject to the shearing stress required to create a free radical.

On the other hand, the dust is very fine and could cause problems in some populations, such as exercising asthmatics, heavy smokers, or people with other respiratory problems. Reducing dust is good practice for any manufacturer and is already required in most jurisdictions.

Rodents

The dust from the carpet is similar in character to a very weak cement powder. (Very little of the calcium is in the reactive CaO form.) It is desiccating and unpleasant. Rodents avoid it. While rodents were abundant in the grass fields around our carpet piles, no scat or rodent tunnels have been seen in the piles.

pH

The pH of carpet is basic but not strongly so and is not a hazard to humans. In newly shredded material, both the released latex and the calcium carbonate increase the pH to the point where it could be considered a hazard to aquatic systems. To avoid this risk, rainwater should be prevented from soaking into the pile and then running off into the environment. Again, control of stormwater runoff is already a requirement in most jurisdictions.

Alkalinity

Our initial laboratory tests indicated some high alkalinity (calcium carbonate) readings in the water. White staining in the gravel rocks of the road around the site indicate that substantial amounts of calcium carbonate was released from rainwater traveling through the whole carpet. The natural alkalinity levels for the streams in this area are 80-100 mg/l. Natural readings in excess of 400 mg/l are possible. Generally, readings on our site were lower than this; however, in areas subject to sequential drying cycles,

reading were higher than this. Like pH, rainwater from the stockpile should be prevented from running off.

Ammonia/Nitrates

Release of nitrogen from pet waste can result in some strong initial concentrations, especially where subject to concentration by drying. After this initial peak, we saw a residual discharge of nitrates over a long period of time from the slow decay of keratin protein. Nitrogen is an important plant nutrient but can cause undesirable eutrophication in aquatic systems and should be prevented from direct discharge.

Conclusions

For all of the components listed above, an aquatic discharge is potentially harmful; a discharge to land, on the other hand, could be beneficial. Most of this determination is under the jurisdiction of the Regional Water Quality Control Board, which I have found to have an excellent understanding of the risks involved and to be very helpful in looking through the process.

Action Items:

1. Require a SWPPP (stormwater pollution protection program) for all recyclers in the chain of custody until a finished, environmentally safe end product is achieved, and then drop all requirements regarding storage. Recycling is mostly a steady-state operation. Things wear out or are used regardless of the economy. Most of the uses for recycled carpet that I have seen are related to the building industry. So long as the storage of this material is not a threat to the environment (i.e., can achieve compliance with SWPPP and a clean bill of health from the RWQCB), there is no legitimate justification for placing a time limitation on storage.
2. CalRecycle should have someone on staff that can understand and evaluate the risks posed by a recycling operation through a biology, chemistry, or toxicology background. This person would evaluate the risks of the operation and evaluate any evidence of risk presented by the local Environmental Management District (EMD). The evidence should be in the form of pictures showing water discharges, water quality measurements, mold samples with the type of mold identified, pictures of dust in the air or evidence that dust has left the site, toxicology studies showing a danger posed by certain contaminant level, or other similar hard evidence. This same person should then act as a liaison, helping recyclers get into compliance. On the public side this person, would educate EMD officials on evidence gathering and substantiation. This should be a CARE-funded position, and the agreement signed to be a member of CARE would also give this individual right of access to members' facilities.
3. Zoning: Currently in the City of Sacramento, carpet recycling is considered to be only allowed in junkyards. So while the City has hundreds of acres in a recycling enterprise zone, carpet recycling is limited to a few small parcels around an acre in size in the Stockton Boulevard area. This happened largely because of a misunderstanding of the risks involved. The State should have a venue for recyclers to complain about unwarranted restrictions on recycling activities. On the other hand, the recycler would also have the burden of proving the lack of risk.
4. Rental Space: It is extremely difficult to find rental property. Many landowners have a story about previous recycler tenants that walked away and left a lot of material behind. The current

CARE proposal that focuses incentive payment on sales to the ultimate consumer should eliminate much of the incentive to walk away. Otherwise, a state program that would allow the recycler to present the name, value, and costs of transport to a product alternative in a cost-effective (better than breakeven) manner would encourage recycling, and a set-aside on CARE or State funds that guaranteed cleanup would alleviate the concerns of landowners and local agencies. In most of the cases where people walked away, the landowner was able to find a waste-to-energy location to take the recycled material at no cost or at slight benefit to the landowner. Most landowners were unwilling to repeat the risk, however, because of the administrative difficulty. For a contractor that specialized in this type of emergency cleanup, it could be a profitable business.

5. If the difference between material being usable or not is a simple matter of washing it, then washing should be considered a process. This is a suggested modification to Title 14.
6. Limitations on storage of construction debris should be applied to the source. The location where the demolition is taking place may be sensitive, and restoration of the site may be important for the neighborhood. Once the construction debris has been moved to a site with an acceptable zoning that allows for recycling and the site maintains zoning conditions (e.g., regarding material stacking height, fencing, maintaining stormwater separation or conformance with a SWPPP, fire protection, or other requirement of the community), the length of storage should not be a factor that is used to put a recycling operation out of business. This is obviously not applicable to cases where there is a legitimate, substantiated environmental concern. If mold, dust, noise, rodents, or smell (in limited cases) reaches nuisance or hazardous levels off site or if there is an unresolved OSHA problem on site, these are grounds to get involved and require changes. Failure to comply with fire code is never acceptable.
7. Pilot Studies: This is a key point where direct involvement by CARE and CalRecycle could make a significant difference. Gaining acceptance of a new product is challenging. If CARE or CalRecycle staff could observe, understand, and be available to substantiate claims of a new recycled product, the outside reference would provide a significant comfort to a new community considering using the material. Assistance with funding at the point would also be important.
8. Supplementing PET/PTT with \$0.12 per pound would be helpful during the period of product acceptance. Once the product is established in the marketplace, this supplement should not be necessary. A product that only works if propped up with a supplement is probably not a good product. Two years should be the maximum period of subsidy for any particular product.
9. Research and Development grants would be helpful.
10. Refusal by CalRecycle staff to sign nondisclosure agreements greatly limits what can be told to CalRecycle staff and restricts the staff's usefulness in evaluating new uses.
11. To my experience, Bob Peoples has demonstrated excellent knowledge of and dedication to finding new uses for post-consumer carpet materials. His knowledge of what has worked or failed in the past and why is very useful in new product development.
12. If you want to spur innovation, protect the innovators. A CARE policy that limits CARE funds to the innovator of the product or those licensed by the innovator for a five year period would protect the substantial investment made to bring a new product to market. Yes, there is a patent process. This would provide some protection of intellectual property but can be subverted by a minor non substantial change in formula or approach. Some truly novel ideas are not patentable.

I believe that there is substantial value from recycled carpet materials will can be realized by using the inherent properties of the material itself. The material is designed to be durable and resilient by the manufacturer. While some of it can be recycled by chemically decomposing and recomposing the product, this is often difficult and energy intensive. Reformatted, every single component, sand, dirt, PET/PTT or PP has many uses that I know of and probably hundreds that can make a significant difference in reducing construction costs, reducing green house gas emissions, and helping to produce food. It is our task and yours to make sure this happens.

If you have any questions regarding these suggestions, please let me know.

Very Truly Yours

Robert Lilly, President
DBD Sustainability