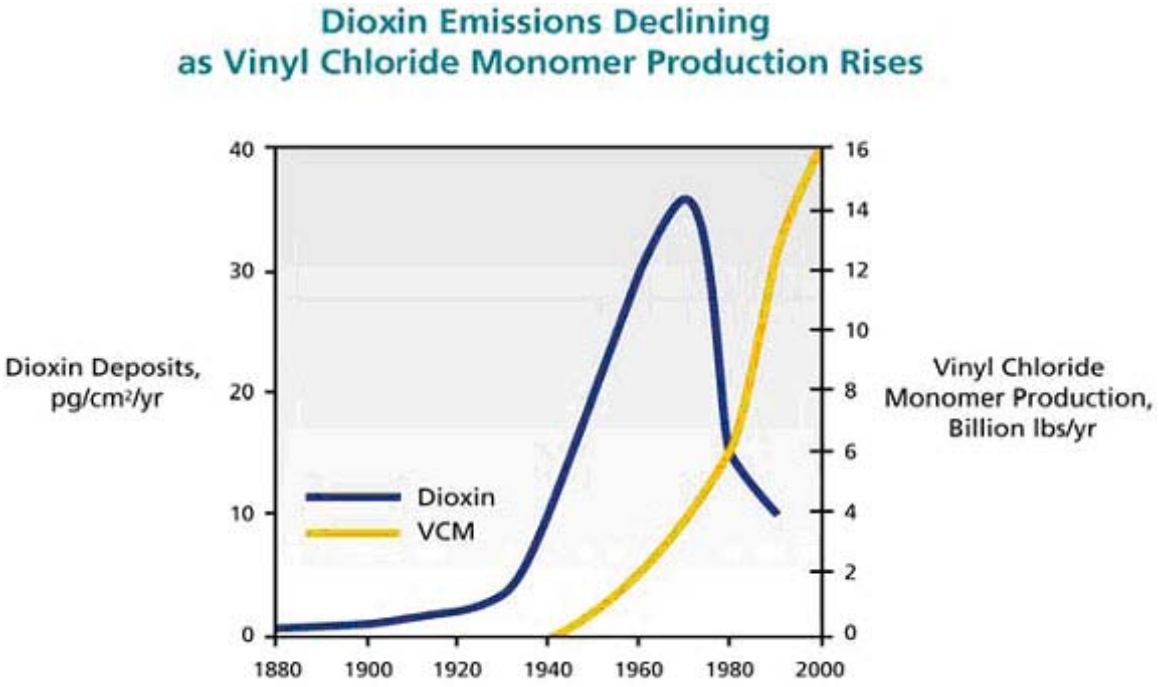
Q2: Do you believe that the requirements presented are appropriate for high performance healthcare facility construction? Please explain.

No, the Vinyl Institute (VI) recognizes the USGBC desire to address PBTs in their LEED for Healthcare (LEED-HC) guidelines, but questions the priority and effectiveness of the approach.

Proponents allege that the credit is issue-based, but it only addresses building materials, and not even all the materials associated with production of dioxin and other PBTs. It also misses the large number of non-material/manufacturing sources of dioxin. According to U.S. EPA's database of dioxin sources, these include coal-and oil-fired utilities, vehicles, wastewater treatment sludge, production of other materials, and many more. (NCEA-EPA 2005), (American Chemistry Council 2007)

PBT reduction strategies based on sound science have already been widely and effectively implemented, showing significant progress, and this credit could be counter-productive, actually slowing progress. The VI provided extensive comment to the TSAC review of PVC and those comments address many of the issues raised by proposed credit MR 4.1. Because these comments are readily available to the LEED Health Care Core Committee (HCCC), we highlight the key points and references relevant here and incorporate the previously filed comment by reference.

- Dioxin emissions to the environment have declined by more than 90 percent since the mid-to-late 1900s, even as production and use of PVC have risen sharply. (Hagenmaier and Walczok 1996); (Alcock and Jones 1996)



An overwhelming number of studies have shown that the presence of chlorine in a product or waste does not correlate with production of dioxin during modern incineration. Additionally, the presence of significant quantities of salt in the environment makes it virtually impossible to starve the chloride out of waste. No governmental authority in the developed world that regulates incinerators for dioxins and furans has a policy to do so by controlling the amount of chlorine in waste.

- In its Dioxin Reassessment, EPA concluded: Although chlorine is an essential component for the formation of CDD/CDFs in combustion systems, the empirical evidence indicates that, for commercial-scale incinerators, chlorine levels in feed are not the dominant controlling factor for rates of CDD/CDF stack emissions. (NCEA-EPA 2000)

- Binational Toxics Strategy Burn Barrel Work Group concluded: There is always enough chlorine in the waste stream, even from natural materials such as salt and wood, to generate dioxins when garbage is burned. Burn conditions, such as operating temperature, seem to be a better indicator of dioxin emissions than chlorine content of waste. The smoldering, high particulate combustion of open burning offers ideal conditions for dioxin formation. (GLBTS 2004)

- US EPA in 1997 stated: [T]he effectiveness of a pollution prevention program directed at reducing dioxin emissions through shifting of waste composition from chlorinated plastics to nonchlorinated polymers would be questionable. (USEPA 1997)

CREDIT MR 4.1 IS BASED ON OUTDATED AND FLAWED ESTIMATES OF DIOXINS EMISIONS FROM LANDFILL FIRES

In the LEED for Healthcare Core Committee responses, Item 2, the committee states:

> *TSAC pointed to the impact of these dioxin sources in its independent 2007 analysis on PVC: "When we add end-of-life with accidental landfill fires and backyard burning, the additional risk of dioxin emissions puts PVC consistently among the worst materials for human health impacts…"*

This comment addresses the TSAC analysis of end-of-life issues.

Backyard burning is irrelevant for the materials reviewed by TSAC.

The TSAC report (Altschuler, Horst et al.US Green Building Council 2007) makes no case for whether the materials it studied—flooring, pipe, siding and windows—are regularly burned in uncontrolled backyard garbage fires. On the contrary, VI finds it difficult to imagine many fully assembled windows, framed

with PVC, being burned in back yards. Unless it can be shown that building materials—pipe, siding, windows and flooring--are often burned in backyards, USGBC must conclude that any materials being burned in this way are consumer nondurables, not components of construction, and thus not relevant to the TSAC study.

The section on Landfill Fires is flawed because the underlying technical citations used in its calculation give rise to answers that are in conflict with fact and common sense.

TSAC inserted the section on landfill fires after the public comment period, and that section had no public review prior to publication. This is a major flaw in the USGBC process, which emphasizes transparency. In addition, the study itself contains major flaws that can only call its relevance into question.

The Landfill Fires section relies upon:

- The United Nations Environment Programme (UNEP) Dioxin Toolkit emission factor for landfill fires of 1000ng TEQ/kg waste burned (UNEP 2005)
- The US Environmental Protection Agency (USEPA) calculation of polychlorinated dibenzodioxins and furan (PCDD/F) emissions from landfill fires, and underlying information leading to that calculation (NCEA-EPA 2006)

TSAC starts from USEPA's estimate of 1126 g TEQ emitted per year from landfill fires (NCEA-EPA, 2006) and divides by the UNEP Toolkit value of 1000 ng TEQ/kg waste burned to estimate 1.126 million tonnes of waste burned in landfill fires each year. While TSAC notes that fires could be above ground (thus burned in year 1) or below ground (thus burned in years 2 and following) adding components from past years to the current burning for any given year yields a result that is functionally similar, modulated by the reduced landfill burning in recent years either by intent or more modern practices.

This calculated amount of material, 1.126 million tons/year, is about 0.86% or $1/116^{th}$ of the waste deposited annually in landfills.(USEPA 2006) This is incredible: it means that on the average, one of every 116 trucks of waste delivered to a landfill burns completely.

The US Fire Administration published one of the few studies attempting to quantify landfill fires (FEMA 2001). This study estimates 8300 fires annually; 64% are said to have originated in "trash or rubbish containers" and are more likely small burn-barrel-type fires. They also note that many "landfill fires" are "tire fires" and not germane to the TSAC analysis. It is unknown how many landfill fires in this study are, in fact, brush or biomass fires, but they certainly comprise a significant number.

Dividing 1.126 million tons of waste by 3000 (36% of the 8300 fires that appear not to be burn barrels), yields an average of 379 tons of waste burning per fire.

This is the mass equivalent of 65 full packer trucks of material (at 6 tons each) and is volume-wise well over 1000 cubic meters, or enough compacted trash to cover a football field approximately three feet deep. This is the calculated average that must be totally consumed per fire if the TSAC estimate is correct.

To test whether 3000 landfill fires of this average size actually occur in the US each year, and in the absence of rigorous statistics on size, number and extent of landfill fires, searches were conducted for 2007 in Lexus-Nexus, Illumen and Google News for press reports of landfill fires. While these searches cannot be considered exhaustive they are indicative of the relative frequency of fires, and whether the estimate of 1.1 million tons of waste burned is reasonable.

Only 28 unique landfill fires were identified by this means anywhere in the United States between December of 2006 and December of 2007. While some of the events are underground fires, mainly in old landfills which have long been closed, most seem to be above ground, and easily contained by the fire service within a day. A number of fires were stump, mulch or forest debris fires. This low number stands in contrast to the 3000 fires estimated in the USFA report.

If, however, there were 3000 landfill fires burning an average of nearly 400 tons each, would they make the local news? Press reports identified in the aforementioned search span from small (a one-hour above ground fire) to large (a year-long underground fire), so clearly even relatively small landfill fires are newsworthy and recorded by local media. The only reasonable conclusion is that there are very few fires of significance in landfills—tens, to at most hundreds throughout the country each year, but not thousands.

One landfill operator summed the situation up this way: (Clark 2007):

> *These things are pretty rare, but I know that we did have one not too long ago," said Fessler, a 33-year veteran.*

He went on to make the important point that modern landfill techniques—including elimination of intentional burning at the landfill, fire prevention, better control of materials entering the landfill, compaction and daily cover are largely responsible for the small number of fires:

> *I know guys who were before my time said they would spend days putting out fires at the landfill. Then again, that was before they started layering the trash with dirt like they do today.*

Importantly, most firefighters also know that landfill fires are rare. Consider this observation (Gardiner 2007) by former Fire Department Safety Officers Association head, Chief (ret) Daniel B. C. Gardiner of Fairfield, CT:

> *I never had a landfill fire in over 30 years and know of only one that started as a surface garbage fire. They are very, very rare.*

Garbage fires—and they are also rare--usually start when a garbage truck picks up a hot load, ignited, for example, by ashes in the garbage. It starts to burn in the back of the garbage truck, and is dropped smoldering at a landfill.

To handle that, we have the garbage dumped on the road, away from the garbage depository or landfill, where it can be easily extinguished. The largest potential hazard in such random pile fires arises from other materials that should not have been there including propane tanks or other containers of highly flammable material. I have seen—and had--those incidents, and it is important for fire fighters and fire safety officers to realize that they can and do occur.

Mulch fires are much more common, started by micro-biological degradation.

The "hot load" incident may be the most common, but such a fire is small due to the segregation and suppression methodology.

That landfill fires are rare is also supported by research done by the California Integrated Waste Management Bureau. CIWMB estimated that there were 25 underground landfill fires in California in the past 15 years—approximately one per year for one-eighth of the US population. (CIWMB)

Additionally, the limited suite of PVC products studied by TSAC—flooring, windows, pipe and siding—are unlikely to be discarded in common municipal solid waste landfills where these fires occur...

There is an extraordinary data gap here that must be filled if USGBC intends to continue to base its opinion of PVC on dioxin generation from landfill fires. It is simply not plausible that nearly 1% of US waste discarded annually burns in landfills. Nor is it plausible that the emissions of dioxins and furans from landfill fires is as large as estimated by TSAC.

Even USEPA tacitly acknowledges it has overestimated the impact, rating its estimate too poor to include in its overall inventory of annual dioxin releases:

Because no data could be located on characterization of landfill fires in the United States (i.e., number, type, mass of waste involved), the limited data available were judged inadequate for developing national emission estimates that could be included in the national inventory (NCEA-EPA 2006).

A blanket negative credit for all halogenated materials—which is clearly aimed at PVC--is proposed in MR 4.1. It is based on a dioxin emission estimate from landfill fires that was not considered of high enough quality to be utilized by the organization (US EPA) that developed it. The landfill fires section of the TSAC report was never submitted for public review before publication, and leads to conclusions that do not make sense. This is poor science and poorer policy.

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