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Waste and Recycling Behavior in the Quad: Problems and Solutions

Independent Sustainability Project

Abstract

This report identifies and analyzes different characteristics that contribute to the Quadrangle Residence Area's relatively poor waste and recycling performance. The majority of students in the Quad consider themselves to be significantly concerned about the environment, and one might expect that the more "eco-conscious" a student is, the better their recycling habits are, but according to the results of my study, this is not necessarily the case. There are other factors at play, including building set up, inadequate informational posters and programs to address what can and cannot be recycled, and a general confusion about recycling that permeates the entire campus. I will introduce the topic, outline the methodology used to acquire the data, identify the results of the methodology, discuss the implications of these findings, and offer a handful of solutions that Smith College ought to consider in order to facilitate better recycling habits among students.

Introduction.

Recycling is a complex issue, particularly on college campuses. Smith College has the worst recycling rate out of the Five Colleges (see Appendix A), and within Smith College, the Quadrangle (or, the Quad, as it will be referred to in this report) is generally recognized among custodial and administrative staff to have the most problems with recycling and waste (McGuiness 2009; Dutkowski?? 2009). There are general problems and trends being seen in the ten Quad residences. The three broad issues are: the disposal of recyclables in the trash bins, the disposal of trash in the recycling bins, and the Quad culture (anonymity of living in a large residence + prevalence of parties = more alcohol containers, more take-out waste, and less feeling of responsibility). The later issue, while significant, will only play a minor role in this report. The most serious issue is not the neglect of putting things in the recycling bin, it is the

confusion around what can and cannot be recycled at Smith, and therefore *contamination* of recycling bins with trash is the most problematic issue. In other words, too much of the wrong things are being sent to the recycling facility.

In order to truly understand the magnitude of the problem, we need to briefly describe why contamination is bad. The perception that everything gets sorted through once it reaches the recycling facility (in Smith's case, the Springfield Materials Recycling Facility (MRF)) is inaccurate. While there *are* employees who take the big contaminants off the assembly line as the materials are dumped in the facility, many things are not easily filtered out. For example, the plastic bottle caps on soda and bottled water cannot be removed due to time limitations. Since they are of a different grade of plastic than the rest of the bottle, the net effect of this contamination is a final recycled product containing air bubbles and holes (Guzowski 2009). Another pertinent example is paperboard. This thin cardboard used to package cereal, for example, is accepted in many municipalities in the United States, which is one of the reasons for its widespread improper disposal by Smith students. However, once the paperboard reaches a recycling facility, it is almost always disposed of due to its low grade. If it does make its way to a paper mill, the fibers in this particular form of paper are too short to adhere to other fibers; the result is the expelling of a thick pulp (Guzowski 2009). Either way, the paperboard ends up back in the land fill. This is harmful economically and environmentally.

The Springfield MRF has set a 10% limit on contaminants, meaning at least 90% of the load must be free from contamination (Springfield MRF website). The loads from Smith are very close to reaching this number, although it is not entirely clear if the limit has ever been exceeded. Not only does putting trash (whether one thinks it can be recycled or not) into the recycling bin increase the risk of Smith's truckloads being denied, the added weight explicitly increases the cost for the college, since it requires more truckloads per month to make the trip to the facility.

The average truckload costs over (sometimes well over) $200 per trip (Guzowski 2009). The smaller trucks make their rounds around the school, dump their loads at the Fort Hill School into a large dumpster, and then this dumpster is taken down to Springfield about three times per month, a number which has been increasing from two, less than a decade ago (Guzowski 2009). The greater the volume of items people have mistakenly taken for recycling, the less cost-effective the college's recycling measures become. Perhaps equally as problematic, students are under the impression that they are doing good for the environment, when in reality, many items end up back in the landfill.

Some of the most commonly mistaken materials are: paperboard, iced coffee cups, and Grab 'N' Go plastic clamshells. In the *methodology* and *results* section of this report, they are referred to as "the big three." The iced coffee cups, whether from the campus center or Dunkin Donuts, have a recycling symbol on them, leading people to believe that this type of plastic can be recycled. However, not only can a the three-arrow recycling symbol mean that the product has been made from post or pre consumer materials and not necessarily suitable for being recycled further, the situation is made even more confusing by the fact that the three arrows are usually just used by the industry to put around the PETE number on the container. In the case of plastic iced coffee cups, the PETE number is one, which means it is not recyclable. These limitations are confusing and perhaps the college has not done enough to clarify them.

On the other hand, there is an incredible number of products that are not particularly confusing, but students still think they are recyclable anyway. These include napkins, tissues, paper towels, bottle caps, brown paper grocery bags, plastic grocery store bags, and wax paper cups. This phenomenon will be explored further in the report. Of equal importance and concern, many students are not aware that everyday household materials like tin foil, milk

cartons, glass jars, or printer paper with staples *are allowed in the recycling bins*. Even soup cans and newspaper are an uncertainty for some students.

The physical set up of the Quad residences should be mentioned, as it is a large part of frustration seen toward waste and recycling responsibilities. Each house is equipped with a recycling and trash area on the first floor only. The people on the upper floors complain of the long trek down to this facility, which is exacerbated by the fact that in the six inner quad houses, there are no elevators. Secondly, the Quad was designed without trash areas in mind, as in the old days maids came to each room individually to collect trash. The make-shift trash and recycling areas on the first floor are small and lack proper ventilation. The smell that can accumulate from containers in the bins, especially houses with high levels of alcohol consumption, regardless of how inane it might sound, is actually a reason why students dislike bringing their waste and recyclables down to the first floor, let alone stand there long enough to sort through everything properly. One of the reasons for the stench and residue build-up in the bins is that the sink is quite a distance away from some students, and dumping out all the contents of bottles can be a hassle.

***Figure 1*:** First Floor Recycling Area

***Figure 2*:** Students often leave bags of trash & recycling in hallways, demonstrating the lack of enthusiasm for bringing items to the first floor, let alone separating them properly.

A major component of this study is deciding who is at fault: the students for being lazy, the students for being environmentally insensitive, the students for being *overly* ambitious about recycling, the institution for not providing better information, the institution not having more accessible recycling areas in the residences, or the inherently confusing nature of the recycling industry. I will conclude that it is ultimately a combination of all of these things.

Methodology

Data was gathered using three primary methods: a survey, a recycling simulation, and interviews. The survey and the recycling simulation were used to acquire both quantitative and qualitative data, while the interviews provided qualitative information. The survey was distributed to all Quad residents through email. In total, 178 residents responded, while around 175 completed it in its entirety, which was a higher-than-expected level of participation. Roughly 20 in each of the 10 houses completed the 5-10 minute-long survey. There were 22 questions. The largest class year represented was the class of 2012, with 33% of the respondents, and the smallest group was the class of 2010, with 13%. Overall, this presents us with a useful cross-section of different Quad residents.

The following questions (and the choices that accompanied them) were asked in the survey. Most were single choice, some were written answer and one had more than one choice:

Figure 3: Survey

Question	Choice 1	Choice 2	Choice 3	Choice 4
How many times per week do you empty your room trash bin?	Less than once per week	Once per week	Twice per week	More than Twice per week
How many times per week do you empty your room recycling bin?	Less than once per week	Once per week	Twice per week	More than Twice per week
What makes up the bulk of your trash?	tissues/napkins/paper towels	product packaging from items purchased (not including food items)	food waste and food packaging (including Grab 'N' Go)	other

Do you spend considerable time and effort separating your recyclables properly, putting them in the correct bin with no caps on bottles, etc.?	YES, always!	Usually	Sometimes	No, not really
On a scale of 1-10, 10 being super eco-conscious, 1 being apathetic to environmental issues, how do you see yourself?	(Range b/w 1 and 10)			
Are you less eco-conscious or more eco-conscious than the rest of your peers in the Quad	More	Less		
How many times per month do you order take-out?				
How many times per month do you get food from an establishment and bring the food/trash home? (i.e. Dunkin Donuts, Taco Bell, McD's)				
Where do you get take-out/delivery from the most?	Pizza Amore	Dominoes	Taipei & Tokyo/Teapot	Other
Have you ever asked the restaurant you're ordering from to withhold napkins or other materials you already have at home, so as to reduce waste?	Yes	No		
How many times per week do you drink alcohol?	Never or less than once per week	once per week	twice per week	3, 4, or more times per week
Are the informational posters near your house recycling area helpful?	Yes-Very	Somewhat, but could be improved	No- I don't have time to look at them	No- What posters?
Do you find that your Earth Rep is helpful for answering questions about recycling?	Always	Sometimes	Not Really	
Do you wish you knew more about Recycling on campus?	Yes	No		
Are people in the Quad particularly lazy?	Yes	No		
What is YOUR biggest obstacle to recycling properly?	Laziness	Lack of Information	Saving the environment is pointless	
Comments/Suggestions for encouraging better recycling habits in the Quad				

Recycling Simulation:

The second method, the recycling simulation, took place during the annual Quadstock celebration outside in the Quad on April 19, 2009. On a table were four containers: one for bottle/can recyclables, one for mixed paper recyclables, one for trash, and one with a variety of different materials that represented a cross-section of everyday products that students dispose of. Groups of students came at random to play a sorting game with all of these materials. The following behaviors were gauged: whether or not the students could identify recyclables, identify trash, and identify the difference between *mixed paper* recyclables and *bottles/can* recyclables. The later is the variable which was not addressed in the online survey. This was also a good time to talk with students, to hear what they had to say about recycling.

Results and Discussion

I. Survey

Figure 4: Results Matrix

Question	Choice 1	Choice 2	Choice 3	Choice 4
How many times per week do you empty your room trash bin?	**Less than once per week: 62%**	Once per week: 33.3%	Twice per week: 3.4%	More than Twice per week: 0.6%
How many times per week do you empty your room recycling bin?	**Less than once per week: 71.9%**	Once per week: 25.9%	Twice per week: 1.1%	More than Twice per week: 1.7%

What makes up the bulk of your trash?	**tissues/napkins/paper towels: 33%**	product packaging from items purchased (not including food items): 26.1%	food waste and food packaging (including Grab 'N' Go): 27.3%	other: 13.6%
Do you spend considerable time and effort separating your recyclables properly, putting them in the correct bin with no caps on bottles, etc.?	YES, always!: 38.8%	**Usually: 39.9%**	Sometimes: 14.6%	No, not really: 6.7%
On a scale of 1-10, 10 being super eco-conscious, 1 being apathetic to environmental issues, how do you see yourself?	(Range b/w 1 and 10)	**Average: 7.2**		
Are you less eco-conscious or more eco-conscious than the rest of your peers in the Quad	**More: 80.7%**	Less: 19.3%		
How many times per month do you order take-out?	Average: 3			
How many times per month do you get food from an establishment and bring the food/trash home? (i.e. Dunkin Donuts, Taco Bell, McD's, etc.)	Average: 3			
Where do you get take-out/delivery from the most?	Pizza Amore: 16.0%	**Dominos: 37.6%**	Taipei & Tokyo/Teapot:33.6%	Other: 12.8%
Have you ever asked the restaurant you're ordering from to withhold napkins or other materials you already have at home, so as to reduce waste?	Yes: 30.2%	**No: 69.8%**		
How many times per week do you drink alcohol?	**Never or less than once per week: 40.4%**	Once per week: 20.5%	Twice per week: 24.4%	3, 4, or more times per week: 14.7%
Are the informational posters near your house recycling area helpful?	Yes-Very: 19.2%	**Somewhat, but could be improved: 58.1%**	No- I don't have time to look at them: 14.0%	No- What posters?: 8.7%

Do you find that your Earth Rep is helpful for answering questions about recycling?	Always: 31.4%	Sometimes: 30.8%	**Not Really: 37.9%**	
Do you wish you knew more about Recycling on campus?	**Yes: 82.4%**	No: 17.6%		
Are people in the Quad particularly lazy?	Yes: 47.3%	**No: 52.7%**		
What is YOUR biggest obstacle to recycling properly?	Laziness: 49.7%	**Lack of Information: 63%**	Saving the environment is pointless: 0.6%	
Comments/Suggestions for encouraging better recycling habits in the Quad				

Materials Quiz portion of Survey: Questions and Answers

Figure 5: Materials Quiz

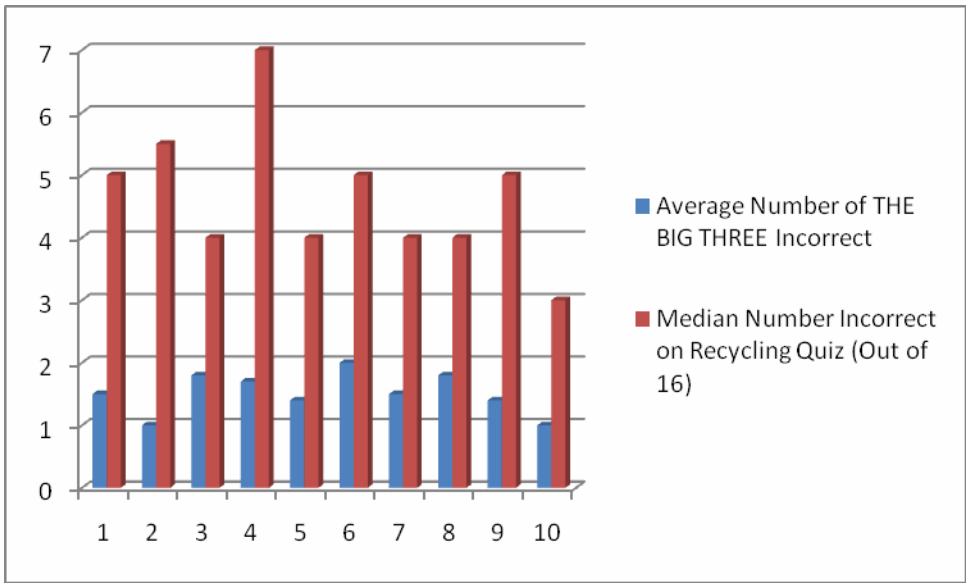
Question: "Are the following allowed in the recycling bins at Smith? (Off the top of your head--don't look up the answers)"

Answer Options	**Yes**	**No**	**Correct Answer**
Newspaper	159	9	Yes
Plastic grocery store bags	9	157	No
Brown paper bags (i.e. from liquor store)	120	47	No
Printer paper	167	1	Yes
Printer paper with staples	63	105	Yes
Envelopes with plastic window	47	120	Yes
Milk Cartons	106	61	Yes
Grab N Go plastic clamshells	49	119	No
Wax paper	23	143	No
Paperboard (i.e. granola bar boxes)	79	89	No
Caps from soda bottles	15	152	No
Plastic Iced Coffee cup	52	116	No
Glass Jar (i.e. pickle jar)	148	19	Yes
Glass Bottle	158	7	Yes
Plastic Gatorade Bottle	158	10	Yes
Plastic Yogurt Containers	88	79	Yes

The pool of survey respondents has some interesting characteristics. 80% think of themselves as more eco-conscious than the rest of their peers in the Quad. It is likely that the students who actually responded to the survey happened to be most interested by environmental issues. Interestingly, not a single person got all answers on the materials quiz portion of the survey correct. In fact, the average number of missed answers was 5 out of 16. Furthermore, there is almost no correlation at all between being "eco-conscious" and having knowledge of recycling.

Figure 6 is a graph comparing the *level of eco-consciousness self-rating* with quiz scores. The x-axis, 1-10, is the number that the student chose to rate themselves, 1 being apathetic to environmental issues, 10 being very environmentally conscious. The y-axis is the median number of incorrect answers on the quiz.

Figure 6:



The results are interesting. Although the group with the eco-conscious rating of 10 scored the best (i.e. the got the least number wrong), there is not a trend that can be disected from this graph. Across the board, students are confused about what can and cannot be recycled, no matter how eco-conscious they are.

There were some behavioral traits that I *under*estimated about the Quad residents, however. I had originally identified laziness, drinking culture, and the number of take-out orders per month to be much higher and/or play a more significant role in explaining the high quantities of waste and seeming apathy towards recycling. However, of the students that took the survey, 55% said that only 5% or less of their room recycling bins were comprised of alcohol containers (even though this seems to be a very low number). About half of the respondents drink alcohol less than twice per week. As far as take-out waste, I was surprised that the average number of times per month for delivery or take-out was three. It should be noted that there was a decent-sized portion of the group that said "10 or more." Pizza boxes were identified as the greatest contributor to the bulk of take-out waste. This will have implications for the *solutions* section. Another question that received surprising results was "Have you ever asked the restaurant you're ordering from to withhold napkins or other materials you already have at home so as to reduce waste." It is promising that even as many as 30% of the respondents said "yes," as the amount of packaging that comes with take-out and delivery order has been striking to many students and custodial staff.

Furthermore, less than half of the respondents considered people in the Quad to be particularly lazy. Less than half identified laziness as a major obstacle to recycling properly. It seems that *lack of substantial information* on what can and cannot be recycled at Smith has been identified as the biggest obstacle. Another question that had implications about the laziness/apathy factor was the "time spent sorting recyclables properly question" was more in line with the predicted answers. 38% said "Yes, Always!," 39.9% said "Usually," 14,6% said "Sometimes," and said 6.7% "No, not really." These answers were more in line with the predicted answers, yet still show that more people than not (at least among the people who responded) demonstrated responsibility to at least attempting to sort and recycle properly.

On the other hand, the *comments* section of the survey might show a larger number of people who see laziness as a problem. At least 75% of the respondents said something along the lines of, "We need bins on each floor!" or "Put more bins on each floor since people complain about the stairs," or even, "there needs to be militaristic insistence on recycling with harsh punishment for refusal to comply; otherwise some people are just too lazy to care." While most people do see the first-floor only recycling area as an issue, it is not something that the school will likely change (Johnson 2009).

The *lack of information* component was clear. 82.4% said they wish they knew more about recycling in the residences. 63% cited "lack of information" as a big deterrent to recycling properly. Only 20% said that the current signage in residences is helpful. Most said that, "they can be improved," while others said that didn't ever look at them at all. As far as institutional support, only 31.4% think their Earth Rep is always helpful in answering questions about recycling, while 37.9% said "Not really."

It is almost inevitable that no student would get all correct answers on the materials quiz, considering the difficulty of some of the questions. For example, "Printer paper with staples" was listed right after "Printer paper," which might trick respondents into thinking that there is a difference between the two. In actuality, staples are allowed in the recycling bin, as they can be easily removed during the sorting process at the MRF, and this *is* written on the informational posters in the residential recycling areas, yet 62.5% got this one wrong. Another material that might have caused confusion is "plastic yogurt containers." Not all yogurt containers are recyclable, but the plastic type is, and this has been campaigned at Smith during the last few years. Perhaps the most difficult material was "envelope with plastic window." While these are accepted by the facility, this type of envelope is not specifically identified on the informational posters, and the plastic and paper together might be counterintuitive.

Paperboard, iced coffee cups, and Grab 'N' Go plastic clamshells ("the big three") get mistaken as recyclable quite often, and due to their prevalence on campus ought to be addressed. Currently they are not listed on any informational posters. Describing the proper disposal of the Grab 'N' Go plastic clamshells ought to be particularly urgent on behalf of the college. These containers are made from corn's Polylactic Acid (PLA), and are therefore compostable, yet as of now the compost program at Smith is not extensive enough to handle this type and quantity of material. Not only are many students unaware of their compostability, but consider them recyclable because they look like plastic. Contaminating the recycling bin with non-recyclables is indeed more problematic than bringing them to a landfill (where they won't biodegrade, but that is currently the best option until composting is expanded).

The results of the recycling simulation backed up much of the information that was gathered through the survey, and further showed the ignorance students show towards recognizing the proper disposal of many materials. Again, not a single individual or group of individuals came close to succeeding at the sorting game. The big take-away point from the sorting game is that in addition to improper differentiation between trash and recycling, there is a general inability among students to decide what goes into the bottles & cans recycling bin, and what goes into the mixed paper recycling bin. For example, most students who guessed correctly that empty milk cartons can be recycled put them in the mixed paper bin, which is incorrect. Tin foil is another material that seemed counterintuitive for people to put in the bottles and cans bin. Students had most difficulty with plastics. In the simulation were many different types and shapes of plastic containers, from chinese food containers to the clamshells that strawberries come in from the grocery store, to product packaging still attached to cardboard. The majority of participants placed almost all plastics in the bottles & cans bin, when in reality the only types of plastic the college accepts are, essentially, bottles. Furthermore, it was surprising to see how

many students thought tissues and napkins could be recycled. A few people made comments like, "its organic, its made from trees, and therefore it can be recycled." There seems to be a general confusion about *what recycling is* at the fundamental level.

At Quadstock, students were also asked to bring down a bag of recyclables in order to procure a free ice cream cone. The four Recycling Representatives (via Building Services) were quick to salvage trash from being thrown into the recycling bins. *Figure 7* shows the huge bag of waste that students *thought* was recyclable. The most commonly mistaken items were brown paper bags, bottle caps, beer boxes, wax paper cups, and plastic bags.

Figure 7:

Further Discussion and Solutions

The confusion over different materials is *mostly* due to the college neglecting to provide enough information. In particular, the information displayed on the posters near recycling areas in residences is not specific enough. There are many everyday materials, such as paperboard,

iced coffee cups, and Grab 'N' Go containers that are mentioned no where. They are adding to the unnessary bulk in recycling bins that the school is paying for.

At the same time, the information already being provided is often ignored. A probable reason for this is the style and placement of the posters. More signs should be on the recycling toters themselves. There are other Earth-related signs in many of the recycling areas that might detract from the important ones. Many of them contain facts about recycling and why it is important to save the planet, with rather cutesy images of trees and recycling arrows. There are two reasons that this is problematic. One, most people are already sympathetic to the environmental cause. Two, instead of being reminded that the earth needs to be saved, students should be reminded about what can and cannot be recycled. The best way to improve the current signage is to create posters with very large, legible text with pictures to get the point across, not to recruit people for the environmental movement. Including obvious pictures of specific items is probably the best way to reach out to the largest number of people.

Another possible solution is to improve educational programs about recycling. Currently, there is no recycling overview in the residences (or elsewhere) during first-year orientation. It would be very helpful to undertake the problem right off the bat by making incoming students aware of how things are done. The role of Earth Reps should be expanded and adjusted, as many students consider them to be unhelpful or underutilized. Part of this role might be coming to campus earlier for orientation to lead the recycling education program. A second type of educational resolution is more hands-on. Smith College should sponsor field-trips to the Northampton landfill or the Springfield Materials Recycling facility. Not only would this help people understand the fundamentals of the recycling process, it would discourage students from generating so much waste to begin with.

As far as tackling the waste accumulation issue, one of the best ways to send less to the landfill, in addition to encouraging students to use less in the first place, is to take advantage of Smith's expanding compost program. All of the paper bags, napkins, and pizza boxes from take-out that make their home in the Gardiner House hallway, for example, ought to be composted. With compost, materials turn into soil that farmers can use to spread on crops, instead of resisting decomposition in the landfill. Currently, Smith has compost bins in five of the major dining halls, bins that are not nearly large enough to handle the additional paper and cardboard waste generated by students. The obstacle to accepting more materials is that the farmers in the area do not yet have the industrial capacity to handle so much compost. However, in the near future this problem will likely be fixed and Smith will be able to greatly expand it compost program (Diggins 2009; Guzowski 2009).

Yet another possibilty to address the recycling issue is to establish a redemption center on campus. In Massachusetts, we can get five cents back on every beer and soda bottle or can by returning it to a redemption center. Moreover, the governor of the state, Deval Patrick, has proposed to expand the Bottle Bill so that more types of containers can be redeemed, such as juice and water bottles (www.bottlebill.org). We might as well take advantage of essentially free money. With money as an incentive, the increased turnout for recycling would be astronomical. A few academic institutions have instated this idea or have begun to seriously consider it, such as Ithaca College and the University of Hawaii.

There is no lack of environmentally consciousness among students, even in the Quad. The problem is that they do not know exactly how their actions contribute to environmental degradation nor how they can change their behavior. This is especially true since, for the most part, they are unaware that they are sorting trash and recyclables incorrectly in the first place. While the school could campaign to make students use less and highlight environmental issues,

there are practical solutions that could to reach the greatest number of people, which ought to be used in conjunction with general sustainable behavior promotion on campus. The four solutions that Smith College should consider implementing are: improved informational posters, more educational orientation programs, expansion of composting, and possibly a redemtion center located on campus. Ultimately, the environmental and economic livlihood of recycling depends on educating students and making recycling *easier.*

Acknowledgements

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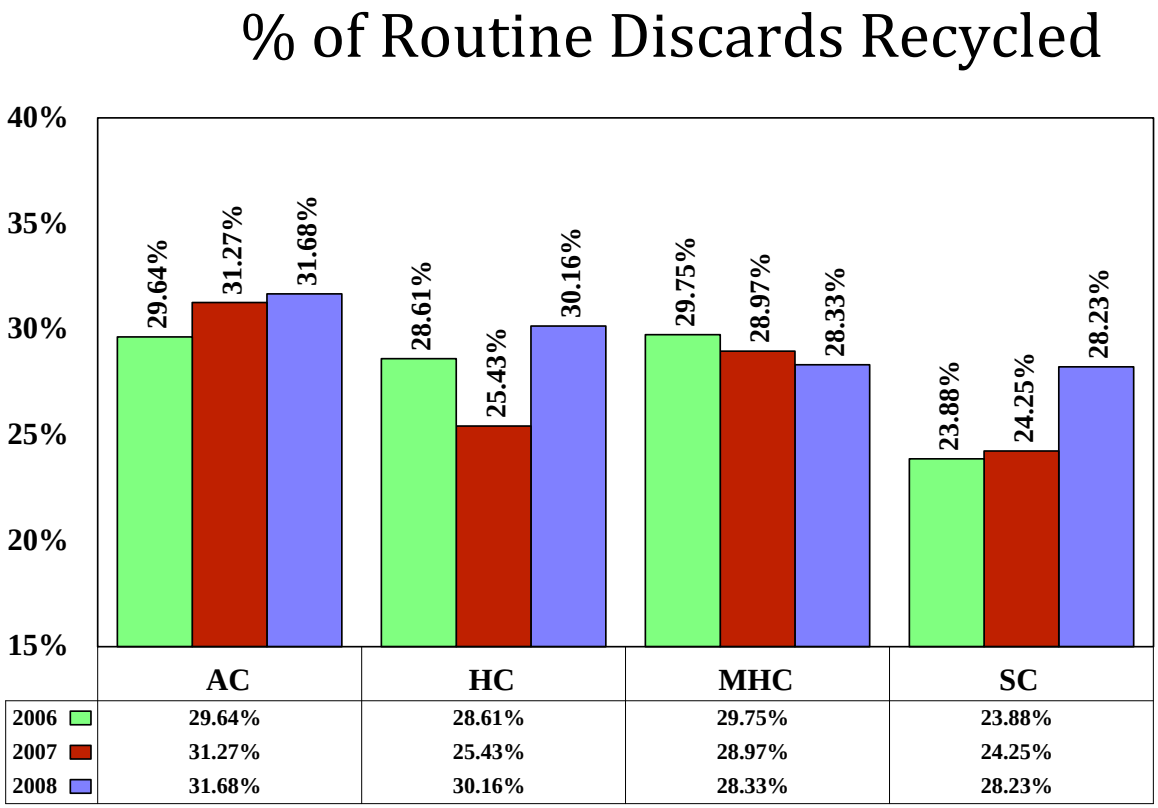
Appendix A:

"% of Routine Discards Recycled"



Source: Guzowski, Roger. "2008 vs. historical 5 College." PowerPoint presentation.