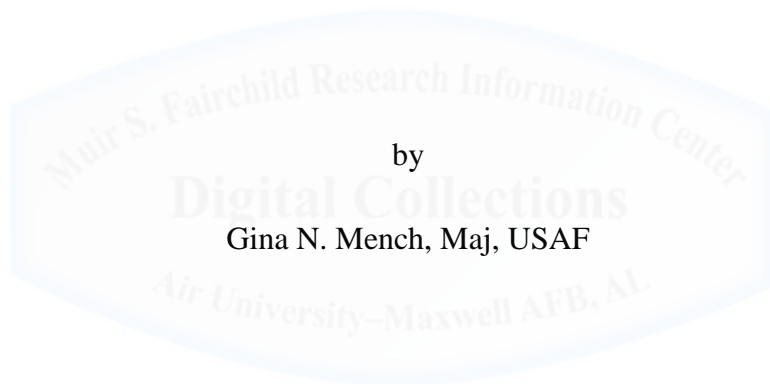


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MESSAGE IN A BOTTLE: A Case Study of the
Peterson Air Force Base Office-Level Recycling Program



by

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PREFACE

I am an avid recycler, and remember learning about “reduce, reuse, recycle” in grade school. I’m also a behavioral scientist at heart, and I love learning about why people do what they do. In my Air Force career, which includes 10 years of reserve service at Peterson Air Force Base, and seven years of civilian service at the United States Air Force Academy Preparatory School, I have observed that recycling in the Air Force is viewed mostly as a personal choice. In contrast, my international travels have taken me to places like Germany, where recycling is an expectation of all citizens. In many European countries, mixing compostable material with glass results in a fine and the opportunity to properly sort your trash by keeping it another week.

I am surprised by the lack of advancements or cultural shifts toward environmental awareness in the 20 years since I graduated from high school. The Air Force and all federal entities have an opportunity to lead this shift, and I see recycling as a vehicle for leaders to identify and solve problems. While there are many worthwhile problems the Air Force could solve, I chose this topic because it has broader roots in leadership and organizational effectiveness. If we can do small things right, we can do big things right. The same goes for doing things wrong.

This research was greatly strengthened by key subject matter experts, Mr. Sean Houseworth (Peterson AFB Recycling Program Manager), and Mr. Clayton LaPointe (Building 1 Facility Manager). Their candid comments and daily efforts to instill recycling culture are much appreciated. Additional thanks to my AFSPC Inspector General teammates, who were willing victims of personal interviews in spite of our high ops tempo.

I wish to thank my amazing husband for his patience and understanding as I spent many of our precious home hours in front of a computer. His ever present encouragement motivated me

in big and small ways. I would also like to extend sincere appreciation to Dr. Stone for his balanced instruction, offering both encouragement and constructive criticism and pointing us toward the next big target (of the many) to shoot at. Finally, deepest thanks to my classmates whose sincere feedback and keen eyes allowed me to see my writing from other vantage points and helped make this a positive experience.



ABSTRACT

The purpose of this case study was to assess the functionality of the recycling program at Peterson Air Force Base, using Building 1 (Air Force Space Command Headquarters) as a representation of the installation. A combination of qualitative and quantitative data was gathered over a two week period, to include interviews with employees and subject matter experts, and visual walkthroughs of building recycling and trash receptacles. Human behavior theories were applied to the results in order to explain observed recycling behaviors and frame recommendations. Evidence showed the program was functioning and even profitable in recycling cardboard and scrap metal, but office product recycling is at a standstill primarily due to user-induced contamination.



Section I: Introduction

Government policy mandates that Peterson Air Force Base (PAFB) provide a program for office-level recycling. A Quality Recycling Program (QRP) exists within the 21st Space Wing Civil Engineer Squadron (21 CES) and collection points are visible across the installation, from indoor recycling bins to outdoor dumpster-type collection points. Employees often cite the visibility of these containers as the reason they know a recycling program exists, but few actually know how the program functions or who is responsible for picking up recyclables and taking them to collection points. Building occupants who use the recycling receptacles do so with the expectation that the program is functional, but many users indicate a lack of confidence in the process, noting that some recycling bins are left overflowing for weeks at a time. While the program appears to be functioning to some degree, recycling participation is almost always viewed as a personal choice, and recycling expectations are rarely communicated.

Whether the barriers to recycling are personal or programmatic, most PAFB members are left to their own devices with the choice to recycle, or not. This elective recycling behavior becomes even more problematic in the DOD's constrained fiscal environment, and on the national scale, the choice to not recycle has adverse ecological and economic impacts. According to the Environmental Protection Agency (EPA), recycling not only conserves natural resources, "recycling and recycled products play an important role in our economy and have significant positive impacts on jobs, wages and tax collections."¹

Potential revenues from recycling may seem inconsequential, yet waste diversion efforts at other AF bases have reduced waste disposal costs by an estimated \$3 million.² In addition to providing a potential avenue for cost savings, recycling helps PAFB comply with Executive Orders (EO), in support of national objectives. In its March 2016 release, EO 13693 called for

changes in government acquisition and use of resources, requiring a 40 percent reduction in greenhouse gas (GHG) emissions by 2025, with the immediate target of diverting at least 50 percent of non-hazardous waste from landfills.³ This policy recognizes recycling as a significant contributor to reaching waste diversion rates, and reducing landfill GHG emissions.⁴

With these expectations of policy in mind, the goal of this research was to assess how well the PAFB recycling program was functioning from multiple perspectives. User-level inputs were validated by visual evidence to determine a bottom-up assessment, while program manager inputs provided a wider aperture view of the program, and valuable top-down assessments.

Human Behavior

Recycling behavior begins with a choice, made by one person, at one given time. The choice involves awareness, knowledge and motivation to act, and with repetition a person will normally form habits of thought and behavior. Consequently, the success or failure of any large-scale recycling program depends on the users and their motivations because the choice to participate occurs at the individual level. Thus, it is important to consider the psychology associated with human behavior, to better understand the connection between awareness (knowing) and action (doing).

Principles of human behavior define motivation as *being moved* to do something.⁵ To be motivated, an action is required, and the origin of the motive is often defined as intrinsic (internal), or extrinsic (external).⁶ Doing something fun or interesting is a reward in itself; the act is intrinsically motivating. In contrast, extrinsic motivation—while still resulting in the choice to act—refers to behaviors performed *in order to attain* a desired outcome⁷ rather than for personal enjoyment. Some people may recycle because they believe themselves to be environmentally responsible and recycling brings them personal enjoyment or fulfillment

(intrinsic motivation), while others may recycle because someone else expects them to or because recycling reduces their trash bill (extrinsic motivation).⁸ The result in both cases is that the person participates in recycling, but the underlying cause of the behavior is different.

In order to gain an accurate picture of the overall program function, I knew user-level inputs would largely impact, if not determine, the outcome. Based on personal observations of coworkers not recycling, I assumed a lack of participation was the problem and set out to discover the human factors which impact participation. Thus, the original focus of this case study centered on the non-recycler perspective, and the underlying causes for this behavior. After-hours walkthroughs confirmed that roughly half of the building occupants are throwing away recyclables rather than recycling them, but subject matter experts ultimately pointed to a much larger problem: user-induced contamination. While this discovery had a large impact on the overall program assessment, human behavior remained a central consideration given that participation and contamination are both user-induced issues which must be addressed at the human level in order to improve the program's function.

Research Question

This case study was conducted to answer the question: ***“How well is the recycling program at Peterson Air Force Base functioning?”*** Since environmental responsibility is mandated by the highest levels of the US government, and the majority of employees expressed an awareness of the benefits of recycling, the aim of this research was to describe and explain the functionality of the installation recycling program. The results were analyzed to better understand why employees engage in recycling, or not, and identify the motivations which underpin their choice. While user-based evidence comprised a large part of the study, recycling participation was only part of the answer to this research question. Programmatic issues were

also investigated to provide a balanced assessment, and in the process of conducting subject matter expert interviews, a larger part of the problem was discovered. Incidentally, this issue appeared to be almost wholly induced by recycling program participants, who are unaware of their role in the problem.

The recycling program function is important for a few reasons. First, recycling helps the AF “comply with applicable federal, state, and local laws and regulations [and] Executive Orders (EO).”⁹ In 2009, EO 13514 issued specific environmental and energy targets to be met by all USG entities, one of which required 50 percent of non-hazardous solid waste to be diverted from the waste stream by 2015.¹⁰ In 2016, EO 13693 set additional future goals for federal agencies to reduce GHG emissions “by at least 40 percent by 2025 relative to a 2008 baseline.”¹¹ Implementation guidance for EO 13693 recognized diversion as “an important waste management practice [which] reduces GHG emissions from landfill waste,” and directed that, “agencies should pursue two primary waste management practices: recycling and composting.”¹²

The second reason for answering this research question is that environmental responsibility is inherent to the AF mission. Air Force Policy Directive (AFPD) 32-70, Environmental Quality, affirms that “the Air Force will conduct its activities according to national environmental policy,” noting that all Air Force employees “are accountable for the environmental consequences of their actions.”¹³ Air Force Instruction (AFI) 32-7002 implements the aforementioned AFPD, and is based on the assumption that, “Inherent in the mission of the AF are the associated environmental responsibilities of protecting human health and the environment and ably managing the natural resources whose care has been entrusted to the AF.”¹⁴ This AFI sets forth a Tier-1 (T-1) requirement that Installation Commanders “shall ensure” that waste management plans are “current, available, and followed by installation

personnel,” and “practices are emphasized to all installation personnel through education and training, to include shop level training, as needed.” At the T-1 level, deviation from instruction must be approved at the Major Command (MAJCOM) director level.¹⁵ Still, a PAFB employee may wonder, *What will it hurt if I don't recycle this bottle?* When the query is multiplied by 3.2 million DOD employees, the daily choice to recycle becomes exponentially significant, and impacts the functionality of all recycling initiatives.

Methodology

This research paper employed a case study framework. The case consisted of personal interviews and observations of recycling and trash receptacles over a two week period. Using Building 1 as the representative population, the current behavior of recycling was studied in terms of people's recycling program awareness, how often they recycled, and their personal motivations for doing so. The overall functionality of the recycling program in Building 1 was assumed to reflect the overall function of the program across the installation.

The goal of this research is to assess how well the PAFB recycling program is functioning, by identifying typical recycling behaviors and the causes or motivations for recycling (or non-recycling) behavior. Since a person's choice to recycle was central to the overall function of the recycling program, user-level evidence was a critical piece of this research. This intent of this assessment was to describe what was happening and discover any user-induced or program-induced barriers to recycling in order to provide useful improvement recommendations. Ultimately, this information is intended to equip supervisors, commanders, and leaders of all levels with a basic understanding of the observed behaviors in the organization with respect to recycling and offer recommendations for improving the recycling program's overall effectiveness.

Research Framework

A case study was the ideal framework for exploring this question because it enabled an in-depth look at a manageable slice of the PAFB population, over a finite snapshot in time. The case study employed both exploratory and explanatory approaches to the research design, since the research question contained both “what” and “why” elements.¹⁶ A combination of quantitative and qualitative data was gathered, to achieve a balance between identifying the problem, and understanding its roots. The case consisted of personal interviews with users and program managers (qualitative data) and visual spot checks of recycling and trash receptacles (quantitative data). The results were evaluated and analyzed through a lens of human behavior and basic psychology principles. Spot checks confirmed that recycling participation is inconsistent, and personal interviews were helpful in identifying patterns in individual motivations, and barriers to recycling program effectiveness. Viewing the results from multiple perspectives aided the development of realistic recommendations for improvement.

Outline

After providing a background of recycling policy, as well as a brief history of recycling in the United States and at PAFB, this paper will describe the recycling results observed at the installation. Key policies will be discussed, followed by a cursory review of psychological principles applicable to recycling behavior. Next, the research framework will be discussed in greater detail to include rationale for the framework selected, the data collection strategy, and the scope and applicability of the case study findings.

The body of the analysis will be presented in detail, to include case study results gleaned from observations and interviews, providing a balance of perspectives from all levels. The key

findings will be discussed in the context of human behavior principles, to highlight and explain how human factors impact recycling, and describe the future outlook of PAFB's recycling program. Next, the paper will outline recommendations for leaders to implement in order to remove or reduce recycling barriers and improve the overall function of the program. The paper will conclude with overall observations gleaned from this case study, capturing the salient points, significant discoveries and assessment of findings in answer to the research question.



Section II: Background and Literature Review

Air Force Recycling Policy

Considering the vast quantities of resources needed to equip and maintain the world's largest military, the DOD and each service must assume responsibility for proper use and disposition of the resources under its care. Guidance regarding stewardship of resources exists at all levels of the Air Force, from DOD and service-specific strategic guidance, down to the unit and facility management levels. All USG employees are directed to comply with a number of environmental and energy standards and directives to achieve waste diversion targets at the USG level. To that end, all AF installations are required to provide recycling programs under Environmental Quality guidance¹⁷ and ensure proper management of resources and waste produced by the installation.

Understandably, safety concerns with hazardous materials and construction waste are much greater than non-hazardous waste, but recent guidance emphasized the need for integrated waste management systems, diversion tracking and recycling goals.¹⁸ Every AF installation is required to meet all higher-level guidance (unless a waiver is approved), and the Base Civil Engineer (CE) Squadron Commander is responsible for implementing the installation recycling program.¹⁹ The CE squadron establishes the base QRP Manager, whose duties are governed by DOD Instruction (DODI) and AFIs. At the unit level, Squadron Commanders and Directors are responsible for ensuring their unit members comply with guidance.²⁰ Leadership efforts are supported by facility managers, who are responsible for the safety, security and maintenance of each building.

History of Recycling

Office-level recycling is a relatively recent concept, but the practice of recycling is not new. In her book, *Recycling in America: A Reference Handbook*, Debra Strong noted that recycling on a large scale has only existed since the mid-1960s.²¹ She describes its small-scale inception with Americans recycling to support war efforts in World War II, but efforts ended with the war.²² In spite of dwindling recycling efforts, awareness had taken root, and in 1970, the government created the EPA in response public concerns about the environment.²³ In 1973, the Resource Conservation and Recovery Act (RCRA) was passed, and still provides Congressional guidance, requirements, and authority to the EPA in carrying out legally enforceable regulations for waste management in the United States.²⁴

Recycling became an expectation within the federal government when Congress passed the Pollution Prevention Act of 1990, which established a national policy governing all pollution-producing activities.²⁵ The AF published implementation guidance in 1994 to prevent, reduce, or recycle pollutants, and establish a Pollution Prevention Program at every installation,²⁶ and this program evolved into today's Environmental Management program. Office-level recycling is part of the DOD's Integrated Solid Waste Management System (ISWMS), and is governed by DODI 4715.23, which sets all DOD-level goals and reporting requirements for hazardous and non-hazardous waste programs.²⁷ Current AFIs direct Installation Commanders to ensure: proper disposal of all waste, to include hazardous and non-hazardous types; members are trained; and a recycling program or QRP business plan is current, and implemented.²⁸

Office recycling efforts on PAFB are led by the QRP Manager, with facility manager support. Receptacles for comingled recycling are provided in each facility, and a recycling yard provides installation members "additional recycling opportunities including separate containers

for plastic, aluminum and tin, [whole] paper, cardboard and glass.”²⁹ Additionally, the Travel Management Office on base accepts Styrofoam, bubble wrap, and boxes which they can reuse for packaging.³⁰

Hartinger Building (Building 1) Recycling Policy

This case study is focused on PAFB Building 1, home of AF Space Command (AFSPC) Headquarters, which is made up of nine staff offices, 10 functional directorates, and approximately 1,200 employees. According to the Facility Manager, a recycling program has existed for all 15 years he has held the position, in accordance with AF and PAFB policy. He stated that in 2011, local recycling technology advancements enabled PAFB to switch to the single-stream, “comingled” recycling which offered additional convenience of not requiring separation of items,³¹ and initially increased recycling volumes.³² Since items no were longer required to be sorted, fewer recycling bins were needed and the old bins were replaced with new, clearly-labeled receptacles, along with signs and photos of what items were intended for “recycle” and “landfill” bins. In addition to the increased aesthetics of the new recycling containers, QRP management conducted outreach briefings to educate each directorate on the new single-stream program, which he believed contributed to increased participation, and adherence to recycling guidelines.

The Facility Manager also confirmed that aluminum cans and plastic bottles are generally the only items recycled within each directorate (unit), and stated that shredded paper is no longer recyclable, due to its flammability and negative impact on the recycling facility equipment.³³ He acknowledged that participation is a key challenge to the program’s function, given that “Directorates are responsible for furnishing plastic bags for the containers and disposing of bags in the appropriate bins at the loading dock.”³⁴

Recycling Participation in Building 1

Based on visual inspections of recycling and trash bins, evidence of participation varied between directorates, and between employees. Receptacles were present in each directorate observed and were usually located alongside the building's "pillars," which are visible from cubicle walkways, thus making receptacles easy to find. Most employees in my unit knew the location of nearby recycling receptacles, and 11 of 14 reported that they recycle in the workplace, with 7 of 14 stating that they did so "consistently."

While waste diversion rates are not tracked for individual buildings, Building 1 facility management estimated that office-level recycling diverts more than 50 percent of solid waste from the landfills, based on the amount of recyclables received at the loading dock collection point.³⁵ Visual spot-checks of common area recycling receptacles and personal trash bins present in employee offices confirmed his estimates. Recyclables were thrown away in 55 percent of regular trash bins observed, lending to the conclusion that about half of all employees recycle with some regularity.

Participation in the building appeared to come close to the 50 percent diversion target based on recyclables exiting the building via collection points, but the volume of recyclable material actually making it the rest of the way through the process was significantly lower. The QRP Manager, however, reported that actual diversion levels base-wide have fallen below 20 percent due to severe contamination of recyclables stemming from user misuse (contamination is discussed and analyzed in greater detail in Section IV).

Waste diversion levels for PAFB are reported semi-annually, with metrics collected by the QRP Manager who reports to the 21 CES Commander. In comparison to state and national averages, PAFB diversion is currently average or below average. According to the Colorado

Association for Recycling, efforts in recycling and composting diverted 21 percent of refuse from the waste stream in 2015, while the rest of the nation averaged 34.6 percent.³⁶

Policy Impacts on Recycling Behavior

Policy and offices of responsibility are fairly well-defined, yet recycling participation and the reasons people recycle (or not) vary widely. While personal motivations are not the focus of this case study per se, the psychology which underpins an employee's personal choice to participate should be considered, since user-inputs determine the recycling program's function.

Paper recycling in AFSPC is notably hindered due to mission-related guidance. In 2008, paper recycling decreased significantly when Air Force Space Command implemented a 100 percent shred Operational Security (OPSEC) policy, directing that "all unclassified paper products across AFSPC, except for newspapers and magazines, will be shredded prior to disposal or removal from the workplace for recycling."³⁷ While OPSEC is paramount to preventing adversarial exploitation of crucial information generated in all work areas,³⁸ this policy created significant issues with recycling program efforts. Paper recycling has a significant impact on diversion rates since rates are calculated by weight, paper is the third most-recycled material in the United States³⁹ and is one of the heavier recyclables by volume. Consequently, the AFSPC contribution to the USG's goal of 50 percent waste diversion is significantly hampered by the existing OPSEC policy.

In addition, the shred policy appears to create confusion in recycling program guidance. While the aforementioned OPSEC guidance indicates that shredded paper is suitable for recycling, the 21st Space Wing (21 SW) Environmental Team notes that shredded paper often forms fine dust and clogs the recycling machinery,⁴⁰ and directs that shredded paper be placed in landfill dumpsters due to the negative impacts of shredded paper on recycling operations.⁴¹

Moreover, the recycling facility policy is to turn away any trucks bringing shredded or pulverized paper to the facility, and when this occurs, the entire truck full of recyclables end up in the landfill.⁴²

The confluence of many separate policies has diminished recycling execution, and confusion was a common sentiment among building occupants interviewed. For example, OPSEC policy supports recycling, yet shredding essentially removes recycling as a practical option. While the majority of interviewees (11 of 14) were aware of the 100 percent shred policy, a significant majority of them were either unsure whether shred was recycled (8 of 14), or incorrectly assumed it was recyclable (2 of 14). Given that 10 of 14 members did not know the correct guidance, it is likely that well-intentioned employees would place shredded paper in recycle bins thinking it was the right thing to do. Most interviewees stated—without prompting—that they felt unaware of the correct paper disposal policy due either to conflicting messaging or lack of guidance.

Guidance disconnects were also observed in online content. The facility manager stated that pulverized paper in any type of bag was not allowed, and it is considered a contaminant for recycling facilities. However, a relatively recent 2014 article states that receptacles for “shredded paper and cardboard are located on the loading dock.”⁴³ Online postings are helpful communication methods initially, but removing or updating them is a challenge since internet searches can still locate old information.

Applicable Psychology and Human Behavior Concepts

Given the program’s inherent reliance on individual understanding of guidance and the personal choice to recycle, it is important to consider the human and social factors related to the behavior of recycling. While entire fields of study are dedicated to understanding human

behavior, a few basic concepts are applicable to this case. A brief discussion of environmental responsibility, motivation, and social norms is helpful in understanding why people—in general terms—do what they do.

Ultimately, understanding these basic human behavior principles can assist leaders in many ways. Leaders who are able to identify and understand a given problem and its roots, are better equipped to effect change and achieve the desired end result. In the case of recycling at PAFB, the problem appears to originate with people, so the solution must be people-focused as well. Most interviewees believed themselves to be environmentally responsible people, and written policy communicates the importance of environmental responsibility, but convenience plays a major role in personal motivation.

According to psychology research, recycling behavior is sometimes determined by a calculated choice rather than an ingrained belief or moral value. Much like intrinsic and extrinsic motivation can both produce the same result, people recycle for a variety of reasons. A University of Illinois study comparing recyclers and non-recyclers concluded that both were “motivated by concerns for the environment,”⁴⁴ but non-recyclers were “more concerned with financial incentives to recycle, rewards for recycling, and with matters of personal convenience.”⁴⁵ With respect to personal or learned barriers, the study concluded that “few demographic characteristics distinguished recyclers from nonrecyclers.”⁴⁶

Similar results were observed in a 2001 study involving social influences and their impact on recycling behavior. Researchers John McCarty and L.J. Shrum concluded that the two most impactful belief constructs consistently tied to recycling behavior are *importance* (long-term personal beliefs), and *convenience* (near-term personal beliefs). In other words, the two key elements of recycling (or non-recycling) were “a general attitude or belief about the importance

of recycling and a specific belief about the inconvenience of recycling.”⁴⁷ Based on this information, all interviewees were asked to rate the importance and convenience of recycling, both in the workplace, and at home (for comparison). Results will be analyzed and discussed in Sections 4 and 5 of this paper.

Social Norms in the Workplace

The work environment is also an important psychological factor, due to the influence of social norms and group dynamics in the work setting. Robert Cialdini, a member of the Department of Psychology at Arizona State University, has published a number of scholarly articles on the topic of social norms and human behavior specifically relating to environmental responsibility. Dr. Cialdini and his colleagues conducted studies involving two important types of normative behavior related to environmental responsibility, and concluded that both heavily influence a person’s choices in group settings. Descriptive norms are behaviors which the average person would consider typical or expected in a given situation or social structure. Injunctive norms describe responses which are socially acceptable and serve to either garner approval or avoid disapproval.

In many recycling initiatives, the typical attention-getting approach is to advertise examples of waste generated and the negative impacts on the environment to motivate recycling behavior. Dr. Cialdini cautions that these messages can backfire and illicit the opposite of the intended response, explaining that, “Within the statement ‘Many people are doing this *undesirable* thing’ lurks the powerful and undercutting normative message ‘Many people *are* doing this.’”⁴⁸ Yet, his studies suggest the same principle could assist with improving recycling efforts if “the prevalent behavior is environmentally beneficial.”⁴⁹ He concludes that leaders or communicators who wish to be persuasive must recognize this distinction and be sure to align the descriptive

norms (what people typically do) with injunctive norms (what people typically approve or disapprove of) in order to “optimize the power of normative appeals.”⁵⁰

The backdrop of recycling history, policy and participation provide valuable context and help frame the findings of this study. This research aimed to analyze the strengths and weaknesses of the PAFB recycling program as a whole, taking into account the multi-dimensional influences of policy, practical guidance and human factors. The next sections of this paper will present the results observed and provide analysis to identify correlations between program inputs and observed results. While correlation does not imply causation, the visible evidence combined with impressions of personnel at all levels helped uncover the underlying causes of the program’s functionality.



Section III: Research Framework

Since the function of the recycling program depends heavily on user input, the framework must take human factors into account. The best source of evidence for office-level results is found in the work environment, and in the mind of the individual making the choice. To identify and understand the motivators which prompt or solidify the desired behavior of recycling, the psyche of recyclers and non-recyclers must be understood. The case study framework was best suited for exploring the functionality of the installation recycling program, considering the significant impacts of personal motivation and other human factors. A case study is a way of conducting social science research, and is often used in topics involving psychology, and sociology.⁵¹ The advantages of a case study include providing more qualitative data and unique insights into dynamic social interactions, so this method was a good fit for discovering employee motivations.⁵²

Data Collection Strategy

Given the wealth of information and qualitative data gathered from case study exploration, the challenge is in the analysis. The data must be collected, processed and translated into understandable results and conclusions. As B.F. Skinner asserts, the important part of case study analysis is not found in the individual pieces, but in “the discovery of some sort of *uniformity*”⁵³ which contributes to greater knowledge on the subject. In order to discover why people choose to recycle or choose otherwise, the “cubicle-level” was the best place to gather qualitative data, and identify valuable patterns or uniformity in the responses. While personal interviews with building management and program managers were a somewhat removed from the user perspective, their top-down observations were equally valuable in providing context for

the problem, gaining a better understanding of the causes and effects within the recycling process and forming a basis for future recommendations.

Scope and Applicability

The applicability of a case study is typically limited due to its narrow scope, but because military units organize and operate in standard ways, the results of one unit or facility could reasonably represent the current status of recycling at the installation level. Similarly, since members of the AF move between installations regularly, the mix of personnel at any given time could reasonably represent the views and behaviors of a larger AF population.



Section IV: In-Depth Analysis of PAFB Recycling Program

The results of this case study were useful in answering the research question in expected and unexpected ways. Visual inspections of over 400 trash and recycle bins provided objective data which confirmed that recycling participation was part of the problem. Interviews with the Building 1 Facility Manager and base QRP Manager validated my initial perceptions of participation and contributed valuable program-level subject matter expertise to the discussion. The discovery that almost all office-level recyclables are not currently recycled was unexpected, but it underscored the level of contamination and helped focus recommendations appropriately.

Interview inputs from members of my directorate were mixed, but provided some common threads. Interviewees validated some of my initial perceptions about the average number of people who do not recycle, and their underlying motivations. On the whole, members of the armed forces understand the value of extrinsic motivators, such as the chain of command, obeying lawful orders and abiding by policies, instructions, and regulations, because these motivators enable mission accomplishment and unity of effort. At the same time, each member is compelled by their own intrinsic motivations, which stem from their personal values, beliefs and experiences. It was here, at the intersection of extrinsic and intrinsic motivations—where organizational expectations meet individual beliefs—that recycling habits reveal valuable insights on human behavior, and leadership.

Recycling Participation Observations

Walk through spot checks of personal trash bins were easy points of reference, and while not exact in recyclable counts or number of checks, the sample sizes were appropriate for the scope and purpose of this case study. I conducted trash bin checks after duty hours in about half

of the open-area cubicles in the building, in order to gather “average” data and avoid impacting normal employee behavior. Trash bin checks were accomplished on two separate occasions and in total, I observed recyclable items thrown away in 210 of 385 personal and common area trash bins utilized by employees, indicating that approximately 55 percent of building occupants do not recycle consistently, if at all. Walkthroughs also confirmed that common area recycling receptacles were visible from main building walkways and were normally placed next to one another, marked clearly with “RECYCLE” or “LANDFILL.” However, only 3 of 18 recycling bins had accompanying signage posted, with pictures and descriptions of the items intended for recycling, and only 1 of 12 landfill receptacles had similar signage. Of recycling bins observed, all but one contained recyclable materials, but the items were not always clean. Additionally, 75 percent of receptacles marked with “LANDFILL” also contained recyclable items (bottles, cans, plastic).

Participation appeared to be a solution to the problem, and a source of the problem itself. Since 45 percent of all observed occupants did not have recyclables in their office trash bins, these individuals appeared to be participating in recycling or not throwing recyclables away. This existing recycling behavior provides a foundation for recycling program effectiveness, and participation near 50 percent matched program manager estimates. Based on Facility Manager estimates, about half of all office-level recyclable material from Building 1 made it into a recycling bin and onto a recycling truck, indicating a clear motivation to recycle. The number of trash bins clear of recyclables indicates that enough people are intrinsically motivated to recycle, and are already making intentional, environmentally responsible decisions which contribute to recycling program efforts. However, the members who make the choice to recycle also appear to be a source of contamination, which is an immense problem for the program as a whole.

Non-Recycling Observations

Participation is clearly a contributor to recycling ineffectiveness, given that 55 percent of employees do not appear to recycle, and the recyclable material discarded in their office trash bins is automatically destined for the landfill. In these cases, failure to recycle is problematic, and increased participation could significantly improve recycling program function. However, of the two user-induced problems, contamination is the primary hindrance to program's function, while lack of participation is a secondary contributor.

Contamination and Diversion Rates

The QRP manager noted that contamination in recycling receptacles was so rampant that recycling trucks have been recently redirected to take all recyclable materials straight to the landfill. Contaminants varied from food left in containers, to trash or shredded/pulverized paper mixed in with recyclable loads. While contaminants cannot realistically be tracked to the source, he was confident that users were the culprit of the problem. The QRP Manager described that when contamination is observed within the recyclable material, trucks are rejected at the recycle yard, also known as the Material Recovery Facility (MRF). When a truck is rejected due to contamination, the only other option is to send it to the landfill, and the entire truckload of recyclable material ends up in the waste stream. He stated that in his six months in the position, every single truckload of recyclables collected by PAFB buildings has been rejected by the MRF due to high levels of contamination.

To mitigate the impacts of contamination, the QRP Manager attempted to negotiate a higher fee (\$25,000 per year) to compensate the MRF for additional sorting time and labor, but the MRF manager turned down the increased rate because contamination was so excessive. At

this point, the QRP Manager made the decision to halt recycling in order to reduce expenses and as a result, all recyclable office products collected from Building 1 and across PAFB are placed in landfills, and none of the truck's contents are diverted from the waste stream. He stated that contamination was an issue across the installation, and the only products still being recycled are cardboard and scrap metal, because they can be more easily separated from the rest of the comingled recyclables and sold for profit. Cardboard and metal, along with composting (grass clippings), make up the majority of the installation's diversion rate, which he estimated is 20 percent (or lower).

Summary of Analysis

The problems plaguing the PAFB recycling program appear to be cyclical. Users expressed a lack of confidence in the recycling program for various reasons, citing the lack of activity with emptying bins, a lack of knowledge about what is recyclable and the absence of senior leader engagement or expectations regarding recycling. This low level of confidence likely results in decreased participation, and lowers recycling volumes. However, users who do recycle may also cause contamination, and ultimately undermine the success of the program without knowing it. In either case, low participation and increased contamination both damage users' confidence in the program, and the problem perpetuates itself.

Section V: Discussion of Case Study Results

Results of this case study confirmed some of my suspicions about recycling participation and employee motivations. Walkthrough observations enabled me to compile visual data and quantify recycling participation and employee recycling habits. Gathering this data confirmed my original assumptions regarding recycling participation, and because I collected the data for myself, I have a high degree of confidence in its accuracy. The blind spots in participation exist mainly in Building 1 secure areas, since I was unable to go behind vault doors and conduct spot checks of employee trash bins. For this reason, I was unable to confirm employee recycling behavior in these restricted areas, but since observations were fairly consistent across directorates I was able to sample, and the QRP Manager observations were similar across the installation, I expect similar (or lower) levels of participation in secure areas of Building 1.

Initially, I believed participation to be low (less than half of employees), and visual observations of recyclables thrown in the trash confirmed this estimation was relatively accurate. However, I discovered that participation was not the major issue, and the PAFB recycling program is struggling a great deal more than I originally thought due to the larger problem of contamination. My confidence in these results is high, due to the diverse types of data I was able to gather (qualitative and quantitative), and the fact that all data points seemed to support the same conclusions. These top-down and bottom-up approaches aided me in researching the question of how well the PAFB's recycling program is functioning, and the answer was clear.

Interviews with users themselves proved invaluable to this research and shed the most light on the underlying causes since users' perceptions ultimately determined their recycling behavior. While I expected user interviews to be the primary source of qualitative data, I found manager-level interviews even more beneficial to discovering the end results of recycling efforts.

Information gleaned from recycling subject matter experts was even more compelling than employee perspectives, due to the magnitude of the contamination issue, and the impact it has on recycling program effectiveness. The Building 1 Facility Manager and QRP Manager provided a detailed portrayal of the root-level problems and validated my observations of recycling participation. Additionally, their perspectives helped frame the recommendations of this research, and underscored contamination reduction as the necessary focus for all recommended improvement actions.

As reported by the QRP Manager, recycling efforts have been stalled by contamination. According to facility and program managers, cardboard is the only office-level product that remains profitable for recycling, valued at \$80 per ton.⁵⁴ Cardboard is also relatively easy to recapture since facility managers are often able to open delivery boxes on the spot at the loading dock, and keep the cardboard from entering the waste stream. They noted that aluminum cans are the next highest profit-generating material, and would likely be profitable as well, were it not for the contamination plaguing the comingled recyclables.

When the recycling program works as intended, it saves the AF money because recycling tipping fees are cheaper than landfill tipping fees. While contract restrictions prohibited him from sharing exact figures, the QRP Manager confirmed that single stream recycling costs the installation much less than landfill waste removal.⁵⁵ In 2012, installation recycling costs averaged \$69 per ton, versus waste disposal rates of \$171 per ton.⁵⁶ Aside from the profitable materials of cardboard and aluminum, office-level products do not make the AF money. Even if truckloads of recyclables were accepted by the MRF and were able to be recycled, it would still impose costs on the AF, but recycling would cost less. The cost avoidance enabled by recycling is complemented by the environmental damage avoided in diverting large volumes of material

(almost 50 percent of all waste) from the waste stream. However, policy directs that financial costs outweigh environmental impacts in non-hazardous waste programs. Even though executive order prescribes recycling as an expectation and sets the 50 percent diversion target, the installation is required to evaluate the recycling program on a business-case basis, and thus cannot lose money in the effort to recycle.

Policy-Induced Problems

Contamination appears to be the largest recurring problem, yet some of it was related to existing policy. The facility manager confirmed that paper strips used to be accepted for recycling, but the policy changed with the waste management contract. He recalled that the previous contractor would accept paper shredded in strips because it could be baled (and thus sold to buyers), but approximately two years ago a new contractor won the recycling bid, and paper shred caused issues with the equipment at the new facility. Facility management updated signage at the loading dock, and disseminated the change via announcement and newcomer orientation, but the lack of knowledge or attention to posted signs still results in recycling program misuse. If bags of paper shred are not removed from the collection carts before the recyclables are loaded on the truck, a bag of pulverized or shredded paper can contaminate a whole truckload of recyclables.⁵⁷ The facility manager noted that sometimes “they cut us some slack” for small amounts of contamination, but he also stated that employees frequently don’t adhere to posted signs. Individuals who bring recyclables to the loading dock appear to rely on their memory of old policies, or they fail to read posted signs, and they actually end up diminishing the overall recycling effort.

While the comingled “single stream” recycling policy initially increased recycling participation,⁵⁸ the Facility Manager and QRP Manager both believe the comingling actually

exacerbated the contamination issue, since employees have differing views on what is recyclable. Part of the issue may stem from a lack of knowledge or lack of attention to detail. Of the employees who do recycle consistently, many incorrectly assumed they knew the items which could be recycled. Ironically, the people who are most dedicated to recycling may be “over-recycling” or including items which cannot actually be accepted, thereby increasing contamination. In this case, recyclers may inadvertently negate the advantages of the comingled recycling policy, and add to the problem instead of aiding the recycling effort as they intend.

Financial Considerations

The business case for recycling at PAFB is completely dependent on users recycling properly. If a the QRP costs more than it makes, the program no longer meets the requirements of a QRP, and the guidance regarding program execution no longer applies. The case for recycling seems simple enough, given that, “Average recycling costs are half of municipal solid waste disposal costs.” While present day recycling fees remain lower than landfill fees, the cost savings is only realized if the truck filled with recyclables is accepted by the MRF. However, costs for the past six months of ‘recycling attempts’ exceeded the cost of dumping the material straight into a landfill because a rejected recycling truck costs more than a landfill truck. In the process of transporting recyclables to the MRF, PAFB incurs a hauling cost (via contract), then incurs another hauling fee when a truck is deemed contaminated and turned away from the MRF, and finally incurs another more expensive landfill tipping fee when the contaminated load is placed in the landfill.

Since DOD and AF Instructions direct that diversion efforts should “create a positive economic benefit,”⁵⁹ the QRP Manager acted in accordance with guidance by directing that all recyclables be taken to the landfill. Since contamination continues to be a problem, and

recycling attempts incurred a greater cost than landfill waste, the priority changed from recycling to expense avoidance. This financial predicament forced the QRP Manager to make the decision according to “business case” rather than environmental responsibility. Redirecting recyclables straight into the landfill was the lesser of two evils. While it was the most fiscally responsible given contamination levels, it rendered the goal of 50 percent diversion impossible.

Interview Results

Many interviewees stated that their decision to recycle was heavily influenced by a few key factors. Their intrinsic belief about the importance of recycling determined their “usual” behavior, while their perceptions about recycling convenience either increased or decreased their extrinsic motivation to recycle. The largest barrier was the employee’s level of confidence in the program’s overall effectiveness, and perception that items were actually recycled.

Interviews revealed that the decision to recycle often occurs like a transaction in a person’s mind. In other words, a person’s perception of the importance and convenience of recycling influenced their intent to recycle (or not). When asked to rate the importance and convenience of recycling, responses seemed to correlate with the person’s recycling behavior. While the two lowest ratings of recycling importance were a 5 of 10, the two respondents reported that they are aware of recycling in the workplace, but do not typically recycle because they don’t think about it (low intrinsic motivation). However, each said they would if they knew it was expected (increased extrinsic motivation). Overall, the average of all interviewee ratings of recycling importance was 7.9 out of 10 in general, and importance of recycling in the workplace averaged 7.7.

Recycling convenience ratings seemed to have a similar impact on recycling behavior. While interviewees rated the overall convenience of recycling as 5.6 of 10 in general, the

average was even lower in the workplace at 4.4. Nearly all respondents could describe the location of the nearest recycling receptacle and felt it was not too far away, but respondents who gave lower ratings (1-5) for convenience did not believe that recyclables were really being recycled, and did not see the point of expending the extra effort to participate.

Almost all interviewees indicated a low level of confidence in the Building 1 recycling program (or they did not believe the program was functional). In fact, recyclers and non-recyclers both expressed views that they heard or suspected that recyclable materials never made it to the landfill based on hearsay, television programming or a personal experience with recyclables being treated as trash in some way. Recyclers and non-recyclers also shared the view that they would engage in recycling more often, or would encourage others to recycle, if they were more confident in the program's function.

The absence of consistent messaging significantly impacted user confidence and diminished recycling behavior. While some non-recyclers stated that they would recycle if "told to" by their leadership, 13 of 14 respondents stated that, other than a short presentation at newcomer's orientation training, they never received ongoing guidance on recycling from their chain of command or building management communications. The lack of discussion or emphasis on recycling in their work life was cited by 10 of 14 interviewees as the reason they believed recycling was a "personal choice."

Future Outlook

The amount of material flowing into recycling bins is close to 50 percent of all waste generated, according to the facility manager and the QRP manager. Both believe that PAFB would easily reach the DOD diversion goal if users followed program guidance and everything that went into the recycling bins was able to be recycled. In their view, the volume of

recyclables being placed in containers is sufficient to reach diversion goals, if contamination was reduced to acceptable levels.⁶⁰ The solution to the problem appears to lie—almost fully—in the hands of the users. Moreover, users are not privy to the recycling program’s current failures, and are unaware of their role in the problem.



Section VI: Recommendations

Office-level recycling has become cost-prohibitive at PAFB, and the program as a whole is broken. If changes are not made, landfill costs will drain the existing QRP bank account balance (over \$320,000), essentially reversing the accomplishments of the recycling program over the past several years. The issue of user-induced contamination is the source of all major recycling program issues, and subject matter experts agree that fixing this issue would not only reduce landfill expenses to a point where the QRP would once again pass the “business case” test, the installation would easily reach the 50 percent diversion target.⁶¹ This knowledge, coupled with a basic understanding of human behavior principles, inform the recommendations below.

Recommendations are intended to equip unit leaders with realistic, concrete action steps for improvement, and are presented with consideration of the high tempo of military operations and the constant demands on all AF members’ time. Each suggestion takes into account the concepts of intrinsic and extrinsic motivation, descriptive and injunctive norms, and perceptions of recycling importance and convenience. The following measures are recommended for immediate implementation.

Follow-up Research. Long-term additional research and follow up are recommended, to assess the future status of recycling and the effectiveness of implementation efforts.

Publicize Current Issues. An announcement about the current “broken” status of the program should be released to all building occupants via email and leaders should verbally acknowledge it at the next scheduled commander’s or “all hands” call. Awareness of the problem will bring attention to the contamination issue, and allow senior leaders to highlight DOD and AF guidance, and communicate the expectation to recycle.

Clarify Responsibilities and Identify POCs. Identify recycling managers or POCs in each unit to strengthen the network of facility management and enable two-way communication regarding recycling performance and barriers, establish a schedule for recycling runs, and police common area bins. An existing Tier-1 requirement directs Squadron Commanders or Directors to “Ensure that each generating activity unit organization designates an employee to serve as a focal point for the organization’s waste management activities.”⁶²

Update and Standardize Signage. Facility Managers should ensure POCs have current/accurate signage accompanying all common area recycling bins, and relocate bins that are not used as often, to alleviate areas where bins tend to fill quickly. Ensure signage matches local MRF guidelines. Since there is only one MRF in the local Colorado Springs area⁶³ and it is a comingled facility, all recycling programs should adhere to the same guidance, but listings of recyclable items seem to differ.

Increase Visual Presence of Recycling. If funding allows, QRP and Facility Managers should procure more recycling bins and signage appropriate for main hallways (atrium). Implementation plans for a 2012 EO noted that, “the development and dissemination of installation-specific waste reduction and recycling information, coupled with availability of easily accessible recycling receptacles seem to have very positive effects on the success of recycling and waste diversion efforts.”⁶⁴ Additionally, visibility of bins and signage was the number one reason interviewees indicated they knew a recycling program existed in Building 1. Increased visual presence could improve perceptions of convenience and renew user confidence in the recycling program, thus increasing participation and awareness of contaminants.

Provide Feedback Regularly. At the QRP or Facility Manager level, establish a schedule and “push” method for publicizing diversion rates, and recycling successes (monthly or

quarterly). If users receive feedback on base performance, they may be more likely to recycle and “eco-warriors” may be more likely to encourage recycling in their offices. Competitions are discouraged, given research which states that rewards usually diminish intrinsic motivation over time.⁶⁵ Leaders should leverage the spirit of competition to focus on goal achievement in two areas: Contamination Reduction and Diversion Rate (i.e. average number of trucks accepted by the MRF).

Incorporate a Requirement for Senior Leader Messaging. Almost all interviewees stated they had never heard anything about recycling from their chain of command and research notes senior leader involvement as one of the most important elements of successful recycling programs. Leaders at the unit level (Commanders, Directors, or Division Chiefs) should clearly express expectations in commander’s calls at least twice yearly, to ensure all unit members understand the expectation to recycle, and involve senior civilians in the messaging effort as much as possible. EO implementation guidance highlights that, “Senior leadership support and effective outreach appear to be the biggest issues affecting solid waste management performance. Installations where base commanders have highlighted the importance of reducing waste as means of more effectively sustaining and supporting mission, and as a way to realize fiscal efficiencies and save money in day-to- day operations, seem to have more effective programs.”⁶⁶

Ensure Awareness Efforts Include All Employees. Civilian interviewees often expressed a desire to recycle, but were skeptical of the program’s function (low confidence). Of the interviewees who did receive guidance on recycling, most were military members, and most said the expectation to recycle was communicated by the Facility Manager during newcomer orientation. Since civilians only attend newcomer orientation upon hiring and typically stay in their positions longer than military members who change stations regularly, civilians are unlikely

to receive further reminders or recycling program updates. Recurring awareness efforts would ensure ongoing awareness of the recycling program for employees and supervisors alike.

Address Manpower Needs. The current QRP manager serves two main functions (water quality program, and QRP). Due to mission essential needs, he spends the vast majority of his time working issues involving water quality and is unable to dedicate time to recycling education/outreach. An additional position would enable greater focus on this program.

Address Paper Shred Issues. Amend the recycling contract before the next bid to require that paper be recycled, or dedicate funding for taking shredded paper to a composting facility. While paper shred may not be recyclable, it can be composted,⁶⁷ and would then contribute to diversion totals. According to EO implementation guidance, “agencies should pursue two primary waste management practices: recycling and composting.”⁶⁸ Composting paper would also reduce the volume of landfill waste, and thus reduce GHG emissions.

Establish Work Release Agreements. Establish agreements with local authorities and PAFB to employ work-release crews to sort recyclables. A successful program at Eglin AFB⁶⁹ is enabled by a working relationship with the local prison system, and inmates work for low wages. If they perform well it is a constant source of income, and good behavior helps them earn daily time away from the prison grounds, and positive supervisor feedback can help them earn earlier parole status.⁷⁰ This workforce contributes to significant recycling program cost savings and could be reproduced at PAFB.

Section VII: Conclusion

This case study investigated the PAFB recycling program and concluded that it is minimally functional, with user-induced contamination as the leading cause of the program's ineffectiveness. A secondary, yet still significant factor is non-participation. The business case for recycling has been overcome by expense, given that recycling is contaminated to the point of rejection and cardboard and metal are the only income-producing materials which can still be successfully recycled. With the problem of contamination uncovered and low participation confirmed, solving the problems plaguing the recycling program must involve changes in human behavior—a much more complex issue which requires leadership engagement at all levels.

Executive Order (EO) guidance sets diversion targets at 50 percent for the US Government, yet contamination more than doubles waste management costs. While about 50 percent of all Building 1 waste makes it into recycling containers, all recyclables produced in Building 1 and other office spaces must be sent to landfills in order to minimize expenses. As a result, these contaminated recyclables cannot be diverted from the waste stream and have decreased PAFB diversion levels to 20 percent or less, well below the 50 percent target. Recycling participation is a secondary problem, evidenced by the presence of recyclables in over half of Building 1 personal trash bins.

Since contamination is the largest problem with the greatest impact potential, all recommendations are aimed reducing user-induced contamination and many suggested improvements are also intended to increase recycling participation and improve adherence to existing recycling guidance. Interviewees confirmed that lack of senior leader messaging has resulted in the widespread perception that recycling is a personal choice rather than a government mandate, so a multi-pronged approach which includes senior leader engagement and

clarified expectations should aid efforts to improve recycling participation, and reduce contamination.

With increased awareness of the recycling program breakdowns across the installation, Building 1 occupants can comprehend the impact of haphazard recycling habits and make small changes that have positive impacts. In cases where extrinsic motivation is needed, employees need to hear from their leaders that recycling is an expectation at all levels of the chain of command. By implementing changes and taking action to support program guidance at the cubicle-level, user confidence can be revived, and the PAFB recycling program can once again become profitable both fiscally and environmentally.

Notes

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