



**COUNTY OF SAN DIEGO
DEBRIS REMOVAL AND RECYCLING PROGRAMS FOR
THE 2003 CEDAR & PARADISE FIRES
FINAL REPORT**



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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
STRUCTURE OF THE DEBRIS REMOVAL AND RECYCLING PROGRAM	3
HAZARDOUS WASTE HANDLING	4
OVERALL PROGRAM CHALLENGES	5
BIN PROGRAM	8
COUNTY MANAGED BIN PROGRAM	8
PBS&J MANAGED BIN PROGRAM	9
BIN PROGRAM CHALLENGES	10
PROPERTY CLEARING PROGRAM	12
PROPERTY CLEARING CHALLENGES	12
RECYCLING AND DISPOSAL FACILITY USE	14
FACILITY CHALLENGES	15
TEMPORARY MIXED RECYCLING FACILITIES	17
TEMPORARY FACILITY CHALLENGES	19
PROGRAM RECYCLING RATES	20
PROGRAM RECYCLING RATES CHALLENGES	22
BIN SITES	23
PROGRAM COSTS	23
PROGRAM COSTS CHALLENGES	24
INDEPENDENT RECYCLING EFFORTS	25
LANDFILL USAGE AND SAVINGS	26

LANDFILL SAVINGS	26
CONCLUSION	27



TABLE OF FIGURES

Figure 1: Fire Affected Areas – October 2003	1
Table 1: 2003 Firestorm Recycling Rates (2003/2004)	2
Figure 2: Destroyed Property in Crest	3
Figure 3: Hauler Bid Zones	4
Figure 4: Burned Auto Batteries and Parts	4
Figure 5: Community Drop-Off Site	8
Table 2: County of San Diego Bin Program Results (2003/2004)*	9
Table 3: Property Clearing Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003/2004)*	12
Table 4: PBS&J Managed Bin Program - Average Hauler Costs by Material Type for County of San Diego Firestorm Response (2004)*	15
Table 5: PBS&J Managed Property Clearing Program - Average Contractor Costs by Material Type for County of San Diego Firestorm Response (2004)*	15
Figure 6: Mixed Load of Fire Debris	17
Table 6: Total Tonnage Received by Julian and LTS Recycling Facilities - Independent & County Programs (2003-2004)	18
Table 7: Types and Quantities of Material Recovered in Mixed Inert Loads at LTS	18
Table 8: All County Fire Debris Removal Programs - Percent Recycling by Material Type for San Diego County Firestorm Response (2003/2004)*	20
Table 9: County of San Diego Debris Removal Program Recycling Rates by Material Type (2003/2004)	20
Figure 7: Clean Load of Metal	20
Table 10: Combined County and PBS&J Managed Bin Programs - Percent Recycling by Material Type for the County of San Diego Firestorm Response (2003/2004)*	21
Table 11: PBS&J Property Clearing Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2004)*	21

Table 12: County of San Diego Managed Bin Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003)	21
Table 13: PBS&J Managed Bin Hauling Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003/2004)	22
Chart 1: Rural Bin Site Use Before and During Firestorm (2003/2004)	23
Table 14: Rural Bin Sites - Percent Recycling and Facility Usage by Material Type During the County of San Diego Firestorm (2003/2004) (TONS)	23
Table 15: Debris Removal Program Costs for County of San Diego Firestorm Response	24
Table 16: Average Costs By Source Separated Recycling Facility	24
Figure 8: SDG&E Utility Pole Recycling	25
Table 17: Independent Recyclers - Estimate of Non-County Program Related Fire Debris Recovery	25
Table 18: Unincorporated Fire Tonnage by Quarter ¹	26
Table 19: Landfill Savings from County of San Diego and Independent Recycling for Firestorms 2003	26

EXECUTIVE SUMMARY

During October 2003 there were two massive wildfires in San Diego County that burned 400,000 acres and destroyed nearly 3,000 residences, 3,000 accessory buildings, and 4,000 vehicles.

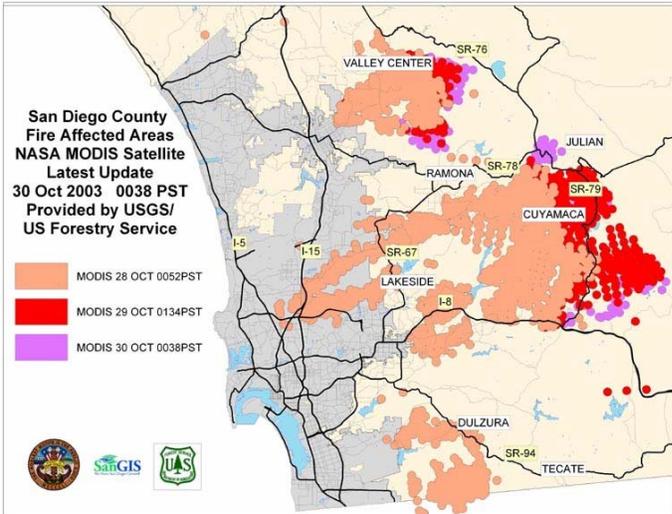


Figure 1 - Fire Affected Areas – October 2003

As a result of the ash and debris left by the wildfires, the County created the Debris Removal Program to assist property owners. The program included two components: a bin program, where residents loaded bins located on or near the right of way; and a property clearing program, where the County contracted for debris clearing through a private company. In the first two months, the County managed the debris removal program by supplementing existing staff; then for eight months, a consulting firm (PBS&J) was retained to manage the program.

The County also offered free removal of burned vehicles and stormwater consultations to prevent endangerments to local waterways. The County sponsored programs assisted in the removal of 26,966 tons of fire debris from properties (Table 1).

County staff knew that recycling efforts would increase if inert recycling facilities were located in close proximity of the affected areas. As a result, two temporary mixed construction and demolition recycling facilities were sited in Crest and Julian. These sites received over 42,000 tons of fire debris and had the ability to produce needed aggregate materials in the immediate area for rebuilding efforts.

Overall, more than 127,000 tons of debris from the unincorporated areas were removed as a result of the fire, and more than 79% of the tonnage was handled by private companies (Table 1). To assist with the cost of the cleanup, the privately owned landfills reduced the tipping fee to \$20 per ton and many of the existing inert recycling facilities reduced fees and offered free vouchers for concrete recycling. Analysis of the County fire response program data indicates that the County supported programs achieved a combined 43% recycling rate. Rates varied dramatically by program and by hauler. The PBS&J contracted bin placement program, where residents loaded their own bins, achieved a 45% recycling rate. In contrast, the property clearing program reached a 24% recycling rate (Table 1).

Table 1: 2003 Firestorm Recycling Rates (2003/2004)

	Tons Recycled	Tons Disposed	Total Tons	Recycling Rate	Program %
County Bin Program	854	1,566	2,420	35%	2%
PBS&J Managed Bin Program	3,622	4,420	8,042	45%	6%
Property Clearing Program	3,008	9,496	12,504	24%	10%
Burned Vehicle Removal	4,000		4,000	100%	3%
Total County Programs	11,484	15,482	26,966	43%	21%
Private Recycling and Disposal	62,172	38,397	100,569	62%	79%
Total	73,656	53,879	127,535	58%	

When combined with the independent recyclers, temporary C&D facilities and recovery efforts at the bin sites, the County was able to preserve 185,000 cubic yards of landfill space.

The data indicates that many debris materials are highly recyclable and the public is willing to separate materials for recycling. However, additional education and stringent monitoring of the clearing contractors is required to achieve a greater recycling rate. Local recycling companies showed a strong interest to assist in the recovery of materials at lower rates than landfill tipping fees. Therefore, the potential for recycling to save time and program costs should be developed in further detail.

This report provides describes the recycling activities in both phases of the County Debris Removal Program, information on the lessons learned from the program, and recommendations for future programs.

STRUCTURE OF THE DEBRIS REMOVAL AND RECYCLING PROGRAM

There were seven primary goals for this program:

1. To assist residents with the safe and timely removal of fire-related debris to protect human health and safety;
2. To develop an optimal operations strategy for managing and recycling disaster debris;
3. To meet 50% recycling rates as required under AB 939.
4. To save landfill space through recycling and reuse;
5. To protect local waterways from debris runoff;
6. To increase, through private investment, the number and type of private sector facilities which can process construction/demolition debris; and
7. To locate recycling processing centers in close proximity to the affected outlying areas.

The County implemented a two-phased fire debris removal program led by the Landfill Management Section with technical support from the Watershed Protection Program (which provided hotline and database staffing) and Solid Waste Planning and Recycling Section (which provided the first two months of hotline and recycling support). Two programs were implemented to help residents clear their properties: a bin program and a property clearing program. A free bin program, where residents loaded bins located on or near the right of way was initiated first. A property clearing and abatement program, where the County contracted for debris clearing through a private company, began second. In the first two months, the County managed the debris removal program by supplementing existing staff; then for one year, PBS&J, a consulting firm, was retained to manage the program.

County staff implemented the debris removal and recycling program based on field visits and models from previous disasters in California. Reviews of the areas showed that the majority of materials by volume included vehicles, metals (vehicles, water heaters, etc.), masonry (chimneys, bricks, bird baths, etc.), charred structural wood, trees and brush, concrete (foundations, sidewalks), stucco, propane tanks, mixed debris (dirt, wood, masonry), and ash. Field staff noted that residents, volunteer groups, and SDG&E had separated materials into piles for recycling in many locations. In some areas, residents segregated metals into ferrous and non-ferrous types.



Figure 2 – Destroyed Property in Crest

County staff reviewed existing recycling efforts and models from other disasters to develop an operational approach that would maximize recycling and FEMA reimbursement. Under AB 939, the County is required to maintain a 50% recycling requirement. If 50% diversion from landfills is not met, the County could be liable for a \$10,000/day fine. All fire tonnage was tracked by jurisdiction and reported to the state quarterly. FEMA also required a stringent tracking system and substantial documentation for tonnage. To meet

this challenge, the County worked with transfer stations, haulers, and landfills to put in special codes at the gates to track fire debris. However, many construction and demolition recycling facilities are not required to have scales, and it was difficult to implement tracking systems at those facilities.

A database was developed to track the amount and type of tonnage delivered to each facility using load monitors and tickets (Attachments 1 & 2). Haulers were required to use County approved tracking forms. Conversion factors were used for materials that were sent to facilities without scales.

The County hired several hauling companies for both programs through a competitive bid process. Companies were paid by the ton, based on each company's competitive bid.

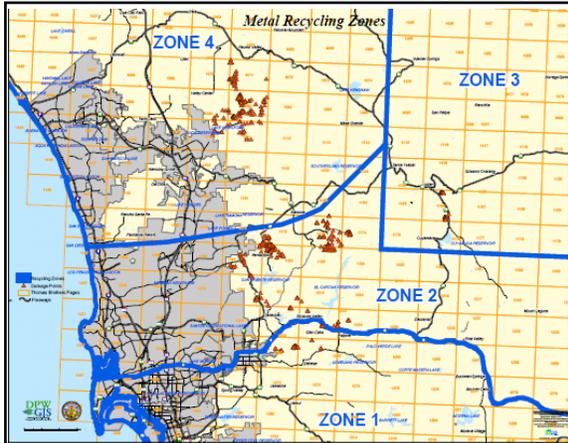


Figure 3 – Hauler Bid Zones

Because the unincorporated County is so large (3,572 square miles), bids were structured by the County according to material type and geographical zones to allow for different bids based on driving distances to the nearest end-use facility (Figure 3). If bids had been taken for bins placed anywhere in the County, the bids would have been very high to cover the bidders' risk of driving longer distances. Invoices were verified using weigh tickets from the landfill or recycling facility. The

County's fire debris hotline was used to provide information to the public concerning the programs and to coordinate cleanup times with the public.

The Department of Planning and Land Use used an existing contract for abandoned vehicle removal contract to recycle approximately 4,000 vehicles. This program is funded through a one-dollar fee, collected with the vehicle registration fee assessed on all vehicles registered in the County.

HAZARDOUS WASTE HANDLING

The County was concerned with residents and volunteers handling hazardous waste, including paint, car batteries, motor oil, pesticides, etc. Site inspections of the burned areas showed that there was little remaining household hazardous waste because of the intensity of the fires. To collect any remaining residential waste that could be hazardous to cleanup volunteers and contractors the Department of Environmental Health hosted three temporary Household Hazardous Waste collection events in the



Figure 4 – Burned Auto Batteries and Parts

affected communities of Julian, Alpine, and Valley Center. To assist residents in the Ramona and north county areas, the hours and days of operation at the Ramona Permanent Household Hazardous Waste Collection Facility were extended and appointments were not required for fire victims. In addition, fire victims were allowed to use the Door-to-Door collection program that was designed for disabled and elderly residents.

A total of 82,074 pounds of material were collected at these events. It is estimated that 17%, 13,300 pounds, of the material was from fire victims.

OVERALL PROGRAM CHALLENGES

Challenge #1 - Lack of a Plan for Managing Disaster Debris

The County's Emergency Response Plan did not contain information on disaster debris handling. Significant financial, staff, and time resources were required to implement the program. Staff required vehicles, radios, cell phones, field kits and appropriate field clothing. Staff was pulled from all areas of the County, (librarians, administrative assistants, etc.) and a significant amount of time was required to train and monitor the staff. If a jurisdiction has a pre-existing plan in place, it is also easier to obtain FEMA reimbursement.

Possible Solutions

Preplanning. The success of a disaster debris and recycling program depends on an operational strategy and negotiating hauling/facility contracts before the disaster occurs. "As-needed" service and supply contracts should be in place to expand current County service contracts. For example, the County's regular vehicle abatement program only had one towing company in place. The company, which had enough trucks to fulfill its regular contract, was overwhelmed and took several months to respond to residents.

The operational plan should include a recycling component and skeleton contracts that can be directly awarded to both facilities and contractors if needed, a public relations plan for educating residents how to separate their debris, an overview of responsible agencies and how the program will be implemented. The plan should include fire debris tracking and recycling data in record keeping procedures to assist with FEMA reimbursement. Data systems should be designed before a disaster, and should include a mechanism to allow daily tracking of facility use.

Staffing. Recycling should be fully integrated into the task of debris management. A debris management/recycling coordinator position should be created to manage administrative and field operations, and Solid Waste Planning and Recycling Office should provide independent oversight to ensure the planned recycling efforts are being implemented. Interdepartmental agreements should be secured to allow use of staff from "field-ready" departments such as building inspection, roads, and engineers. There should also be better countywide coordination and regular meetings to realize resources and keep all staff aware of County Programs.

Challenge #2 - Debris Impact on Local Landfills and Meeting State Required Recycling Laws

Recycling of materials is a legal requirement to comply with California Integrated Waste Management Board (CIWMB) regulations under AB 939. If this is not established as a higher priority than present, the County could be liable for \$10,000 a day fines for not meeting a statewide 50% diversion requirement. The County is able to deduct disaster tonnages from its annual disposal tonnages if it is demonstrated that the County diverted a majority of the recyclable materials. In addition, recently released data from the 2003 Countywide Integrated Waste Management Plan Siting Element indicated that insufficient landfill capacity could exist as early as 2007, in terms of permitted daily disposal tonnages.

Possible Solutions

Scout Areas before collection. Because the composition of debris is highly variable, areas should be scouted before collection to identify concentrations of materials that can be collected and delivered to source-separated recycling facilities.

Require Source Separation of Debris. Residents, volunteer groups, and contractors should be required to separate debris into the following categories, metal, fire-related wood, source-separated inerts (if not from foundations, driveways, swimming pools). Mixed inerts can be a combination of concrete, asphalt, red clay brick, concrete block, with up to 10% sandy soils.

Management must require recycling within the removal program. To ensure that recycling requirements are met, managers **must require** that staff enforce recycling requirements with all contractors.

Load Check Oversight. Many load checkers did not enforce recycling requirements and contractors were able to deliver recyclable loads to landfills. Therefore, a system must be developed to review the load checker's records each day.

Expand Recycling Availability. Staff should work with local landfill, transfer stations, and any temporary drop-off sites to provide for recycling. The majority of the transfer stations and rural bin sites offered recycling drop-off sites for concrete, burned vegetation, and metals. Some metals were also recycled at Sycamore and Ramona Landfills, but the two landfills did not separate concrete or other inerts from the wastestream.

Pursue Potential for FEMA reimbursement for mining the isolated fire debris at Sycamore Landfill. Many jurisdictions have sued FEMA for reimbursement due to lack of landfill space after a local disaster. Staff should pursue this and identify if existing funds could be used to match FEMA to purchase equipment to excavate and process materials buried at the Sycamore Landfill (25% local jurisdiction: 75% FEMA).

Challenge # 3— FEMA Reimbursement

It was difficult to determine what actions the County needed to take in this program to ensure reimbursement from FEMA. The direction received from FEMA was to proceed as "normal" and after the fact; FEMA would determine the eligibility of the program. The

problem was that the County had never done this type of program before so there was no “normal” -- and FEMA was unable to provide specific guidance to match the situation. For example, one FEMA requirement was that bins be provided only “curbside,” and only as community bins for multiple residents (this is because FEMA covers debris in the road right of way but not on private property). This may work well in an urban setting where there are curb gutters and sidewalks, but was nearly impossible in the backcountry, where roads were winding and narrow, often with no shoulders, and where a resident’s driveway can be half a mile long. Although the reason for this is that, in accordance with FEMA guidelines, “private property owners are responsible for their own debris removal,” the fact is that immediately following a disaster everyone is anxious to clean up, and no one at that point has the means to do so on their own. Even those with insurance (which were few and far between) would not see money for debris removal for months.

In the end, FEMA only reimbursed the County for the costs of the Bin Program. The Private Property debris removal program was not approved for FEMA reimbursement even though the County’s Department of Environmental Health conducted an ash characterization study that showed that there were state-regulated levels of hazardous constituents in the ash. The County's administrative appeals of this decision were denied, and no judicial appeal is allowed. As of January 2006, the County is working the State Office of Emergency Services to secure partial re-imbusement of private property debris removal costs from the State.

Possible Solutions

Create a working relationship with FEMA to facilitate the exchange of useful information. Set up a protocol for bin placements and debris management in advance of next disaster. Have contacts and reports from other jurisdictions that have successfully obtained reimbursement from FEMA as case studies.



BIN PROGRAM

The County's bin program supplied empty roll-off bins, typically 30 or 40 cubic yards in size, to be used by citizens to quickly remove debris from their property. This program was provided at no cost to the fire victims. In the first two months, the County managed the bin program by supplementing existing staff; then for one year, a consulting firm, PBS&J, was retained to manage the program. Cleanup contractors were encouraged to place bins so that they could be used by the community as drop off sites.



Figure 5 – Community Drop-Off Site

COUNTY MANAGED BIN PROGRAM

Through a competitive bid process, several waste hauling companies were hired by the County to provide bins to fire victims. When the bins were filled with fire debris, they were emptied at a landfill or recycling facility. Bids were requested based on geographical zones according to proximity to major disposal sites and roadways. Collection contracts included language indicating that the County required recycling and that haulers were expected to utilize recycling facilities in a particular order of preference. Five haulers were awarded the contracts: Waste Management, Ware Disposal, Pacific Waste, Dependable Disposal, and Tayman Industries. Haulers selected for contract awards were provided with training booklets for their field staff about program guidelines and facility requirements before starting work (Attachment 3). Companies were paid by the tons collected based on their competitive bid price.

The County coordinated heavily with volunteer groups in an attempt to coordinate bin placement with their activities. At first it was thought that these groups, many of which were National religious organizations, could exclusively order the bins as they went through areas to assist with debris cleanup. It was quickly apparent, however, that these groups were limited in their resources and were only able to help certain communities. The County then extended the program to all residents. The free service was advertised at local victim assistance centers, and through local media.

To facilitate the free bin program, the County initiated and maintained a fully staffed, 8-hour-a-day fire debris hotline. The hotline provided information to the public and acted as a clearinghouse for all aspects of the County's fire debris removal efforts, including scheduling bin deliveries and pick-ups. The bins were requested by both individual property owners and by groups cleaning multiple properties. All bins were used by the surrounding community, which means that anyone could place structure burn debris in them, not just the person who requested the bin. The owners of the property on which the bins were placed were required to sign right-to-enter forms (Attachment 4) prior to receiving a bin. Residents requesting bins were also given information on proper bin loading and material handling safety (Attachment 4).

Staff worked with residents to identify an estimate of the quantity of material on site and schedule roll-off bins accordingly. Only structural fire and ash debris was allowed to be

placed in the bins – no vegetation, concrete from foundations or walls, or asphalt from sidewalks or driveways¹. Residents were encouraged to separate large quantities of clean materials (metal, wood, concrete, dirt, etc.) from other burn debris, since those materials would be recycled. Residents were given six days to fill the bin.

The County had monitors checking the locations of the bins to ensure they were being placed on the properties for which right-to-enter forms had been received. The County placed load tickets on each bin that indicated what kind of load the driver was carrying and what type of facility the driver should take the load (Attachment 1). Load monitors also checked bins to ensure that non-fire related debris and foundation/sidewalk/swimming pools were not placed in the bins. Carbon copies were returned to the load monitor allowing immediate load tracking capability.

Once the bins were filled, the hauling company picked them up. Recyclable materials were directed to inexpensive source separated recycling facilities or to the pilot mixed inert recycling facilities. All remaining mixed debris and ash was sent to separate cells at the Sycamore and Ramona Landfills for possible future mining.

PBS&J MANAGED BIN PROGRAM

In January 2004, a private consulting firm, PBS&J, was hired to manage the bin program and to start the property clearing protocol for getting bins to residents and created a more comprehensive monitoring system and online database (Attachment 6) for FEMA reimbursement.

The PBS&J monitoring program was more stringent than the County program in that sites were inspected prior to bin placement. Photographs of the right-of-way were taken with the suggested location of the bin placement from multiple directions. Each bin was issued a load ticket stating the location of disposal (Attachment 7). Photographs were taken of the loaded bin and the material in the bin. The photographs were a valuable tool in obtaining FEMA reimbursement.

OUTCOME – Overall, the bin program was very successful in assisting in the timely clean-up of structure fire debris. Over 1,500 bins were provided, which facilitated the disposal or recycling of 10,590 tons of fire debris. The program had a 43% average recycling rate (Table 2).

Table 2: County of San Diego Bin Program Results (2003/2004)*

	TONS			
	Recycled	Disposed	Total	Recycling Rate
County Bin Program	854	1,566	2,420	35%
PBS&J Managed Bin Program	3,622	4,420	8,042	45%
Total Bin Program	4,476	5,986	10,462	43%

*For a complete list by facility and program see Appendix 1

¹ This was a requirement of FEMA.

BIN PROGRAM CHALLENGES

Challenge # 1— FEMA Reimbursement and Monitoring

FEMA requires evidence that the program is monitored to ensure that the bins only contain fire related debris. Often, haulers did not communicate to their drivers that these tickets dictated the type of material and where the bin was to be taken for recycling/disposal.

Possible Solution

Better training is needed for all contractors participating in the debris removal programs.

Challenge # 2—Hauler Bids

Haulers bid varying prices per ton on hauling mixed inerts, metal, mixed debris and trash. Although the money paid for the material by the recycling facility was intended to offset this difference, the end result was that the hauler could make more money per load by delivering the material to a landfill than a recycling facility (Appendix 3).

Possible Solution

Whether County staff or contracted vendors are utilized in disaster debris recovery operations, FEMA will require cost-effective operations as a condition for reimbursement. Resources devoted to monitoring of contracts related to building renovation, building demolition, collection and hauling of debris, and delivery to processing facilities will more than pay for themselves to assure that the program is efficient and that FEMA does not disallow costs. It is important to ensure that trucks are full when they leave collection sites, that hauling prices are appropriate for the tonnage and type of material collected, and that claimed diversion rates are actually achieved. In addition, the City of Los Angeles was able to prove to FEMA that diversion activities should be reimbursed, even if they cost more than current disposal costs, based on FEMA's practice of honoring local policies and the Los Angeles policy of maximizing diversion in accordance with AB 939.

Research FEMA Requirements for Reimbursement. The County should negotiate with recycling and disposal facilities for the best rates for all materials. Haulers should be monitored closely to ensure they are using appropriate facilities. If hauler quotes are used, all quotes should be negotiated for the best price.

Challenge #3 - Bin Misuse

Since the bins were community bins (not for the exclusive use of a single property owner) and the bins were left on-site for several days it was not possible to monitor the material placed into the bins resulting in several cases of non-allowed material being placed in the bins and several instances of the bins being filled beyond their weight capacity.

Possible Solution

Education. The County provided signs for the haulers to place on each bin that illustrated what types of materials would bring bins to weight capacity, and supplied the guidance to all volunteer community groups. In the future, more resources should be used to create large bin signs to educate residents on the materials that are allowed to go into the bin.

Large centralized collection areas for greater public use could be organized. Existing transfer stations, bin sites, private and public property (parks, roads stations, etc), could be used. This method was successfully used by Samaritan's Purse to clear a majority of the properties in Crest. Centralized drop-off sites also provide for easy monitoring to prevent illegal dumping and contamination of recycling bins.

Challenge #4 - Bin Demand

Because of the high number of burned properties, there was a tremendous demand for bins both inside and outside the County program. There were a limited number of bins available in the region, which limited the number of bins available to the County's program. In many cases, residents wanted bins immediately, but then found that they did not have the means to fill them for quite some time. Because the backcountry had many large lots, it was difficult for people to move heavy items the distance to the bin. This further limited the availability of the bins. The unavailability of bins eventually led to the County supplementing the program, since the wait time for bins occasionally exceeded two weeks, which impeded the program.

Possible Solution

Work with haulers to see if additional bins would be available outside the region. Set up rules at the outset limiting the amount of time a bin will be provided (i.e. one week maximum). Consider using other sources than waste haulers for bins, including contractors with dump trucks and other equipment.



PROPERTY CLEARING PROGRAM

The County property clearing program provided debris removal and disposal to private property owners. Cost to the property owner was based on the amount of insurance available for debris removal. Fully-insured property owners were responsible for the entire cost of debris removal and disposal, while those underinsured were responsible for only a portion of the cost. Service was provided to uninsured property owners without cost.

The owners of the property to be cleaned were required to sign a right-to-enter form, which included homeowner's insurance information. County monitors checked on the clean-up work being provided by the contractors to insure only the correct materials were being removed from the property. The County contractors were required to separate metals for recycling from other burn debris. Only structure fire debris was cleaned from private properties – no vegetation, concrete from foundations or walls, or asphalt from sidewalks, driveways, patios, or swimming pools.

Several contractors, HVAC, A&D, and Whillock, were hired to do the work through a competitive bid process. Contractors were hired to clean properties to the foundation. Cleanup contracts included language indicating that the County required recycling, and that contractors were expected to utilize recycling facilities in a particular order of preference. Companies were paid by the tons collected based on their competitive bid price.

OUTCOME – Overall, the private property clean up process was successful, with the County cleaning 333 parcels of structure fire debris. Almost 12,500 tons of fire debris was recycled or disposed. The program achieved a 24% recycling rate (Table 3).

Table 3: Property Clearing Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003/2004)*

	Concrete		Metal		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	136	1,610	441	1,398	970	9,496	1,547	12,504
Material Type % of Total	13%		11%		76%			
Total Recycling Rate	24%							

*For a complete list by facility and program see Appendix 2

PROPERTY CLEARING CHALLENGES

Challenge # 1 – Getting Insurance Information

It took an inordinate amount of time to secure insurance information from a number of property owners. This information is important in determining if it's necessary to bill a property owner for a portion of, or the entire cleanup performed by the County. This lack of information inhibits the County's ability have final closure to the program.

Possible Solution

In the original right-to-enter forms, there needs to be more information concerning the time property owners have to provide insurance data and the consequences of not providing that information in a timely manner.

Challenge # 2 - Recycling

Contractors under the property clearing contract did not source separate. Although contract language required that property clearing contractors recycle, the program only reached a 24% recycling rate, with one of its contractors only recycling 15% of the tonnage handled (Appendix 2). In comparison, the free bin service, where residents loaded their own bins, the recycling rate was 43% (Appendix 1). The data indicates that the debris is highly recyclable and the public is willing to separate materials for recycling.

Possible Solution

More training, enforcement of separation at the site, and monitoring of trucks at the facilities were necessary to ensure they were attempting to meet the specifications and deliver the loads to the correct location. Strict monitoring of the property clearing contractors is required to achieve an optimal recycling rate. Non-compliance with recycling could result in non-payment of contract invoices.



RECYCLING AND DISPOSAL FACILITY USE

Because the County does not own or operate any recycling or disposal facilities, the debris removal program used privately operated facilities for processing.

The general principles, which guided the program's use of facilities, were:

1. Develop several facilities located near the devastation to encourage competition, increase recycling rates, divert maximum tonnage from local landfills and minimize cost of tipping fees, standing time, and travel time.
2. Require monitoring and evaluation procedures, which ensure smooth mid-program changes when required, and provide information required by FEMA.
3. Encourage creation of permanent facilities that can process mixed construction and demolition debris after the debris removal program has ended. The lack of this type of facility was cited in the County's AB 939 plan as a major barrier to achieving high recycling rates for this type of material.

At the outset of the fire debris removal program, all debris was delivered to transfer stations and landfills. The Regional Water Quality Control Board issued a waiver to allow for disposal of the ash in lined sections of local landfills. Emergency waivers were issued by the County of San Diego Local Enforcement Agency (LEA) for three landfills (Otay, Ramona and Borrego Springs) to accept additional tonnage generated during the clean-up. In addition, the County of San Diego LEA issued two temporary emergency permits for construction and demolition processing facilities (LTS in Crest and Julian Recycling). The City of San Diego LEA also issued a temporary C&D processing permit for the Sycamore Landfill. The privately owned landfills reduced the tipping fee to \$20 per ton and many of the existing inert recycling facilities reduced fees to assist fire victims. Emergency waivers were also issued to five rural bin sites (Barrett Junction, Boulevard, Campo, Palomar Mountain, Ranchita) and five transfer stations (Julian, Viejas, Palomar Transfer, EDCO Station - La Mesa and Ramona MRF) to accept materials that exceeded the permitted daily totals.

The County worked with the Sycamore and Ramona Landfills to recycle metal and the bin sites to accept wood and metal. In addition, two temporary emergency recycling facilities were added to the program (. Not only did these actions increase the County's ability to recycle, they also decreased hauling costs, because facilities were selected that were located in close geographical proximity to the various hard hit areas of the County, thereby decreasing the truck round trip travel time. Truck travel is estimated to cost \$70 per hour at P.U.C. rates, and is charged roundtrip.

Many privately owned recycling facilities exist within the County of San Diego that accept the types of materials generated by the program. These "source separated" facilities generally have strict requirements for accepting materials to ensure that the quality of materials is appropriate for use in the manufacture of an end product or for reuse. Over the course of the program, recycling staff worked with six source-separated recycling

facilities to relax their specifications. Each facility determined what would work for their site, and they charged a higher facility fee, however, the increased cost was much lower than the landfill tipping fee cost. This type of load was called “mixed inerts” and included a combination of concrete, asphalt, red clay brick, concrete block, with up to 10% sandy soils and 5% trash. These facilities provided more opportunities for decreasing program costs, standing time at facilities, and truck hauling time.

In contrast, facilities that recycle materials from mixed construction and demolition (C&D) loads do not exist in the County of San Diego. Therefore, all mixed loads that could not be source separated were directed to local landfills for disposal.

FACILITY CHALLENGES

Challenge #1 – Varying Rates for Haulers and Facilities

When bids were requested from haulers, there was a wide range in the bids from hauler to hauler, even though the haulers were using the same facility. This was mainly a result of separate agreements that each hauler had with each facility. In some cases, the cost for recycling was higher or equal to the cost of disposal (Tables 4 and 5). However, once landfill rates were restored in April 2004, most recycling rates were below the landfill costs.

Table 4: PBS&J Managed Bin Program - Average Hauler Costs by Material Type for County of San Diego Firestorm Response (2004)*

	Zone			
	1	2	3	4
LANDFILL (1/1/04 – 3/31/04)	\$58.67	\$66.25	\$77.38	\$70.00
LANDFILL (4/1/04)	\$88.42	\$96.00	\$107.13	\$99.75
METAL	\$46.33	\$50.50	\$78.75	\$51.67
INERTS	\$51.33	\$55.75	\$75.00	\$60.33
DEAD RUN (no pickup)	\$65.00	\$65.00	\$65.00	\$65.00

*For individual hauler bids see Appendix 3

Table 5: PBS&J Managed Property Clearing Program - Average Contractor Costs by Material Type for County of San Diego Firestorm Response (2004)*

	Zone			
	1	2	3	4
1/1/04- 3/31/04				
LANDFILL	\$ 215.33	\$ 218.67	\$ 248.00	\$ 233.67
METAL	\$ 195.67	\$ 199.00	\$ 235.00	\$ 217.33
INERTS	\$ 161.00	\$ 164.33	\$ 187.33	\$ 179.33
Effective 4/1/04				
LANDFILL	\$ 207.75	\$ 212.75	\$ 256.75	\$ 235.25
METAL	\$ 209.92	\$ 216.58	\$ 253.25	\$ 253.25
INERTS	\$ 161.67	\$ 171.67	\$ 220.00	\$ 220.00

* For individual contractor bids see Appendix 4

Possible Solution

Consider contracting directly with recycling facilities. This approach would allow the County to get a better rate and diminish the desire for a hauler to take materials to the landfill/transfer station. It gives the County contractual leverage in pricing, materials

specifications, and materials handling. In addition, this will allow the County to track the materials to ensure they were recycled allowing FEMA reimbursement.

Challenge #2 – Determining Debris Sources

It was difficult to determine what debris was from the County-sponsored program and what was from private industry.

Possible Solution

Monitor facilities. In any scenario, monitoring facilities is a crucial part of ensuring FEMA reimbursement. Site visits also ensure the quality of the data and that the material is being recycled. For example, under the system utilized in the 2003 firestorms, there was no method to track if the materials delivered to Ramona Transfer Station were charged to the County as mixed debris or clean inerts. For more than a year there was a stockpile of about 4,000 tons of clean inerts and no tracking method to determine how much of that was County hauled.

Challenge #3 – Lack of Mixed Processing Facilities

San Diego County has an extensive network of source-separated material recycling facilities; however, there were no mixed processing centers.

Possible Solution

Work with companies to expand mixed debris processing capacity. In any disaster, mixed debris processing capacity will be required. There is a strong need for C&D processing capacity now. The County should work with local businesses to determine what their short and long term mixed debris processing plans are. Once prepared, in the event of a disaster, FEMA funds can be used to build additional temporary recycling infrastructure needs, to improve ongoing C&D recycling efforts that aid AB 939 compliance, to lower future C & D recycling costs (and therefore demolition and construction costs in both the private and public sectors), and to purchase equipment for County Department maintenance activities that support recycling.



TEMPORARY MIXED RECYCLING FACILITIES



Figure 6 – Mixed Load of Fire Debris

With the advent of the fire, most of the aggregate recycling facilities lowered rates or allowed victims to deliver clean loads of concrete and asphalt for free. This assisted in recovering a significant amount of clean inerts for recycling. However, site visits to burned properties indicated that much of the aggregates were contaminated with a small amount of wood or metal material. The County worked with recyclers to allow small amounts of contamination in the loads and to document what the increased costs would be to the haulers. To educate haulers about the relaxed specifications, the County developed a *Fire Debris Recycling Guide* and disseminated the guide to all County contractors and franchised waste haulers (Attachment 1)

As part of the survey of recyclers, the County invited recycling companies to operate emergency construction and demolition recycling facilities. Two new facilities were opened in Crest and Julian in order to efficiently handle fire-related materials. The prime materials targeted were

inerts, and metals. The recycling of these inert materials was also important to save landfill space, and to maintain County diversion rates required by the California Integrated Waste Management Board. The establishment of the facilities was a part of the best faith effort needed to get credit for the fire-related tonnage saved when determining annual County diversion rate. The recycling facilities were located at:

LTS Equipment Inc. Recycling
1682 Mountain View Rd
El Cajon, CA 920121
(by Crest and Harbison Canyon)
Operators: Luke and John Gibson

Julian Recycling Center
3578 Highway 78
Julian, CA 92036
Operator: Richard Books

The primary objectives of these facilities were:

- To save costs of transport;
- To conserve the road infrastructure by reducing the mileage per trip from the ruins to distant recycling plants; and
- To reduce costs of materials when the rebuilding occurred by having stockpiles closer to the rebuilding sites.

Both sites were granted emergency permits that were lifted after one year of operation. Since so much recyclable metal remained at burned properties in Julian, metal recycling was added to the emergency permit. The Julian site received 3,889 tons of concrete

and 443 tons of metal. LTS received a total of 38,338 tons of debris. The results from the recycling facilities are included in Table 6.

Table 6: Total Tonnage Received by Julian and LTS Recycling Facilities - Independent & County Programs (2003-2004)

Facility	TONS				
	Concrete	Metal	Vegetative	Trash	Total
Julian Recycling	3,889	443			4,332
LTS	37,443	43	6	417	38,296
Total	41,302	873	6	417	42,628

It became clear shortly after opening the two facilities that the segregation of mixed materials was important. At LTS, a project was initiated through the Recycling Section of the Department of Public Works to segregate mixed loads of metal, wood and mixed inerts. The mixed inerts pilot at LTS consisted of processing 703 loads. Of that total 45 loads (417 tons) were sent to the landfill. This equates to approximately 0.6 tons of waste per load. Assuming an average load weight of seven tons, the following types and quantities of materials handled in the pilot can be extrapolated as follows:

Table 7: Types and Quantities of Material Recovered in Mixed Inert Loads at LTS

Concrete		Metal		Vegetative		Trash		Total
%	Tons	%	Tons	%	Tons	%	Tons	Tons
86%	4,260	5%	239	0.07%	5	8%	417	4,921
Total Recycling Rate		92%						

The total mixed program at LTS cost \$16,092. Disposal costs were \$10,017 (417 loads at \$24/ton) and \$6,074 in drop fees for the 25-yard roll-off bins. This equates to a program cost of \$3.27 per ton. When combined with the \$18 per ton tipping fee charged to the haulers, the facility cost was \$21.27 per ton for processing mixed inerts. This price was slightly higher than the temporarily reduced landfill tipping fee of \$20 per ton, however the location of the site saved significantly on transportation costs.

During the course of the program, the County worked with four additional private companies that stated a desire to operate emergency recycling facilities: Allied, J. Cloud, Escondido Sand and Gravel, and Ware Disposal. A description of efforts with these facilities follows:

- **Allied.** The Allied facilities (Sycamore and Ramona Landfill) received the majority of the tonnage generated from the fires. Therefore, initial efforts were made to encourage the facilities to separate metal, wood and inerts from the incoming materials. Both the Sycamore and Ramona landfills were granted emergency CDI recycling permits, however little material was recycled. Allied dedicated an excavator to pull large pieces of sheet metal from the incoming materials. However, at the peak times of processing they were only able to pull about 35 tons of metal per day from about 1,000 tons of debris. Because the state law required that the debris be placed in a lined landfill a separate cell was

established to place the fire-related materials.

Roll-offs for both wood and metals were also delivered to the County bin sites. This effort recovered a significant amount of material for recycling.

- **Escondido Sand and Gravel.** This company was willing to pilot receiving mixed inerts with up to 5% contamination. However, the County was unable to direct loads to the facility.
- **J. Cloud/Hestor Granite.** A meeting was conducted with J. Cloud to explore options. The company was interested, however, as the County program did not include the ability to direct loads, the facility did not receive the level of tonnage required to make a pilot project worthwhile.
- **Ware Disposal.** Discussions were held with Ware Disposal to have them process the debris in their C&D processing facility in Orange County. However, the company was unable to perform the hauling functions needed by the County and the contract was not utilized.

TEMPORARY FACILITY CHALLENGES

Challenge #1 – Getting Emergency Permits for Facilities

It took time to get staff up to speed on current regulations and what documents were needed for the emergency permits.

Possible Solution

Have staff be familiar with emergency facility permitting issues and have contacts with the Local Enforcement Agency, the Department of Planning and Land Use, Air Pollution Control District, and any other pertinent agencies.

Challenge #2 – Processing of Materials

The Julian Recycling Center has taken several years to process the tonnage from the fires because of equipment failure and staffing issues. As a result, the facility is working with the Local Enforcement Agency to comply with the holding and processing regulations of the emergency permit.

Possible Solution

Have governmental assistance grants available for start-up facilities to improve infrastructure.

PROGRAM RECYCLING RATES

County contractors hauled a total of 3,190 loads and handled 22,969 tons of debris under the two fire response programs (Table 8). Of that total, 33% was recycled. Inerts comprised the largest fraction of the materials recovery totals (19%), however, since metal is significantly lower in density than inerts, more interesting was the amount of burned metal collected from the debris removal programs at 13% of the total or 3,035 tons. When the 4,000 tons collected through the vehicle abatement program is included, metal is 26% of the total material handled by all of the County programs (Table 9). The bin program stressed recycling more than the property clearing program, and recycling benefited when management had a recycling priority.

Table 8: All County Fire Debris Removal Programs - Percent Recycling by Material Type for San Diego County Firestorm Response (2003/2004)*

	Concrete		Metal		Vegetative		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	446	4,368	863	3,035	23	81	1,858	15,482	3,190	22,966
Material % of Total	19%		13%		0.4%		67%			
Total Recycling Rate	33%									

*For a complete list by facility see Appendix 4. Does not include 4,000 tons removed through vehicle abatement program.

Table 9: County of San Diego Debris Removal Program Recycling Rates by Material Type (2003/2004)

	Concrete	Metal	Vegetative	Trash	Total
Tons	4,368	7,035	81	15,482	26,966
Material Type %	16%	26%	0.3%	57%	

*Includes metal from the vehicle abatement program.

When a load analysis was conducted, 66% of all loads (by weight) were taken to the Sycamore and Ramona landfills (Appendix 1). Therefore, the potential for increasing the amount of recycling in future disasters is highly likely.

The two collection programs had very different recycling rates. The bin program, that required residents to separate materials for collection, averaged a 43% recycling rate (Table 10); whereas, the property clearing program only reached a 24% recycling rate (Table 11). The bin loading program recovered 2,758 tons of inerts (26%) and 1,637 tons of metal (16%) (Table 10). A small amount of burned wood and vegetation was recovered (81 tons or 0.8%) at the Sycamore and Ramona landfills as well as at the mixed inerts pilot at LTS.



Figure 7 – Clean Load of Metal

Table 10: Combined County and PBS&J Managed Bin Programs - Percent Recycling by Material Type for the County of San Diego Firestorm Response (2003/2004)*

	Concrete		Metal		Vegetative		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	310	2,758	422	1,637	23	81	888	5,986	1,643	10,462
Material % of Total	26%		16%		0.8%		57%			
Total Recycling Rate	43%									

*For a complete list by facility see Appendix 1

Contractors from the property clearing program primarily used the landfills; more than 76% of the loads were delivered to Sycamore and Ramona landfills (Appendix 2). Individual hauler recycling rates varied dramatically with HVAC recycling almost 72% of the materials collected versus A&D having a 15% recycling rate (Appendix 2.1-2.3).

Table 11: PBS&J Property Clearing Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2004)*

	Concrete		Metal		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	136	1,610	441	1,398	970	9,496	1,547	12,504
Material % of Total	13%		11%		76%			
Total Recycling Rate	24%							

*For a complete list by facility see Appendix 2

County staff managed bin program and the PBS&J Managed Bin Program were compared (Tables 12 and 13). At the outset of the program, when the County staff managed the project, the program reached a 35% recycling rate. This program attempted to directly manage the designation of loads to recycling facilities through load tickets; however, throughout the two month period, the haulers ignored the load tickets and 68% of the loads were sent to Sycamore landfill (Appendix 1.1). The most significant form of recycling in this period was the recycling of metal by Waste Management at their transfer station in El Cajon.

Table 12: County of San Diego Managed Bin Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003)*

	Concrete		Metal		Vegetative		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	42	317	110	524	2	13	200	1,627	354	2,420
Material % of Total	13%		22%		0.5%		67%			
Total Recycling Rate	35%									

*For a complete list by facility see Appendix 1.1

During the PBS&J managed period, less than 31% of the loads were delivered to Sycamore and the recycling rate for the program reached 45% (Appendix 1.2). For this program a new contract was let with stricter recycling requirements.

Table 13: PBS&J Managed Bin Hauling Program - Percent Recycling and Facility Usage by Material Type for the County of San Diego Firestorm Response (2003/2004)*

	Concrete		Metal		Vegetative		Trash		Total	
	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons	Loads	Tons
Total Loads/Tons	268	2,441	312	1,113	21	68	688	4,420	1,289	8,042
Material % of Total	30%		14%		0.8%		55%			

Total Recycling Rate 45%

*For a complete list by hauler and facility see Appendix 1.2

It should be noted that 314 loads or 1,959 tons had no ticket associated with the load in the database. In many cases the database indicated that the material was recycled. In most cases this tonnage was allocated as landfilled mixed debris, therefore, the recycling rate could be up to 3% higher than reported.

PROGRAM RECYCLING RATES CHALLENGES

Challenge #1 – Program Recycling

It was difficult to guarantee that haulers and contractors recycled. The upper management of the hauling companies did not communicate with drivers and field workers about the load monitoring tickets and their purpose to direct loads of clean materials to recycling facilities.

Possible Solutions

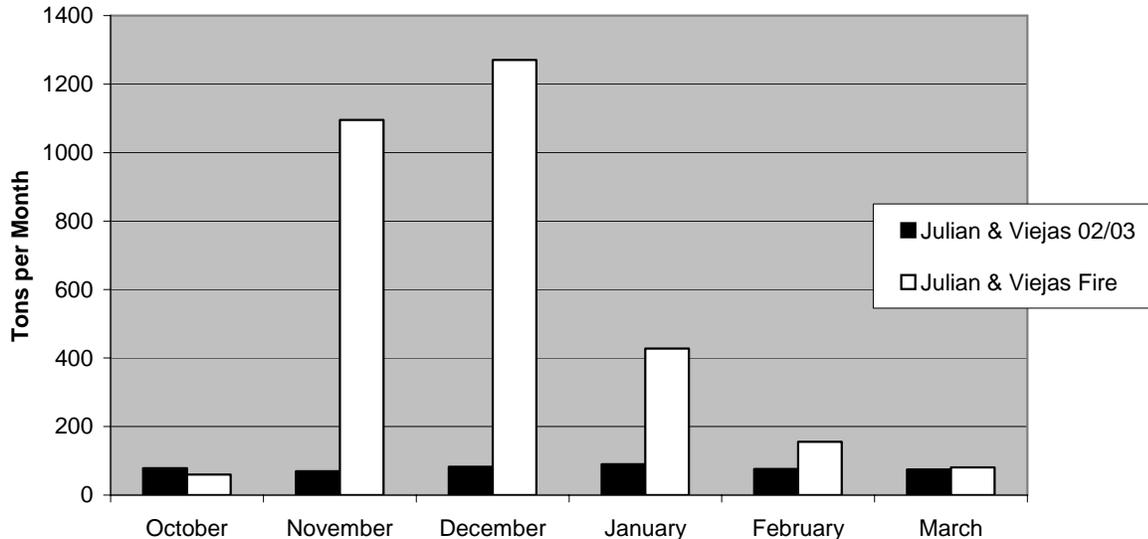
Use a monetary incentive to the hauler for use of a recycling facility. If the County chooses to receive bids to collect and haul the debris at a fixed cost per ton per load in the future (and it contracts directly with recycling facilities), it can consider including a monetary incentive for use of “source separated” recycling facilities. Thus, contractors would have the incentive to haul loads, as quickly as possible and to ensure the material is recycled to the highest extent possible. The County should require that loads be delivered to recycling facilities only, and give incentives if the load is delivered to a source separated facility.

Provide numerous incentives for contractors to use recycling facilities. Throughout the debris removal program, haulers continually ignored County requirements to use recycling facilities. A point system in which contractors obtain points for using recycling facilities could be developed, or they should be fined using a non-compliance fee if the material is not delivered to the correct location.

BIN SITES

At the outset of the fire response, the County requested that Allied place roll-offs at the County rural bin sites to allow residents to bring source separated wood and metal at no charge. The response to this program was overwhelming. The flow of materials to the bin site increased dramatically (Chart 1).

Chart 1: Rural Bin Site Use Before and During Firestorm (2003/2004)



Note: Does not include Palomar data
Source: Facility LEA emergency waiver reports

Of the total amount of debris sent to bin sites, 93% was recyclable materials (Table 14). This does not represent an accurate recycling rate because residents only delivered items that were free of charge. However, with more than 2,800 tons collected at the bin sites, the potential for use of drop-off locations for future planning efforts is clear.

Table 14: Rural Bin Sites - Percent Recycling and Facility Usage by Material Type During the County of San Diego Firestorm (2003/2004) (TONS)

Facility	Metal	Vegetative	Landfill Disposal	Total	Facility % of Total
Julian	1,861	670	133	2,664	87%
Viejas	153	155	30	338	11%
Palomar			59	59	2%
Total	2,014	825	222	3,061	
Material Type % of Total	66%	27%	7%		
Total Recycling Rate	93%				

PROGRAM COSTS

The average cost per load was \$1,860 or \$258 per ton (Table 15). This cost includes \$2.3 million dollars for a management contract, but does not include County staff time.

Table 15: Debris Removal Program Costs for County of San Diego Firestorm Response

Program	Management	Contractor	Total	Cost/ Load³	Cost/ Ton³
Combined Bin ¹	\$1,109,309	\$705,642	\$1,814,951	\$1,105	\$173
Property Clearing ²	\$1,225,999	\$2,891,123	\$4,117,122	\$2,661	\$329
Total Debris Removal	\$2,335,308	\$3,596,765	\$5,932,073	\$1,860	\$258

(1) Haulers were paid for both County & PBS&J bin programs.

(2) Includes \$81,000 for asbestos removal

(3) Total Loads = 3,190 and Total Tons = 22,966

More than 5,400 tons (24%) of the entire tonnage collected was delivered to source separated recycling operations for base, dirt, wood, and metal, this figure does not include recycling or reuse at the landfills (Appendix 4). Tipping fees for these type of facilities range from \$20/load for clean dirt to \$22/ton for woody material. Base facilities charge approximately \$10/ton and metal recycling facilities pay for burned metal on a per ton basis (Table 16). If haulers had been required to tip their loads at recycling centers significant money would have been saved.

Table 16: Average Costs By Source Separated Recycling Facility

Facility	Average Cost per Ton	Material Type Recycled
Sycamore	\$20	Disposal (Reduced fee from \$48/ton for fire debris)
Julian Recycling Center	\$20	Clean and mixed inerts
LTS	\$10 - \$18	Clean and mixed inerts
J. Cloud/Hester Granite	\$10 - \$12	
Hanson ¹	\$10 - \$12	Clean inerts
Escondido Sand and Gravel	\$10 - \$12	Clean inerts
Re-Rock	\$7 - \$10	
Pacific Steel	Will pay for burned metal	Burned metal

(1) Hanson also gave vouchers to the County to give to residents for free recycling of concrete.

PROGRAM COSTS CHALLENGES

Challenge #1 - Costs are difficult to compare. Since facility tipping fee costs were included in the per ton charge by the haulers, it is difficult to determine the actual costs and savings accrued by recycling.

Possible Solution

The County should have contractors bid on the program and then take an average. All haulers operating under the program agree to one cost. Any materials that can generate revenue, like metal, should be taken into consideration for the bids.

INDEPENDENT RECYCLING EFFORTS

A survey of independent recycling companies was conducted as a part of this report to quantify the total amount of debris generated from the fires. Because many inert processors are not required to report by jurisdiction or have scales, measurement of data was difficult. Of the facilities that were able to provide figures, it is estimated that private industry achieved a 62% recycling rate and handled over 100,000 tons of fire debris (Table 17).



Figure 8 - SDG&E Utility Pole Recycling

Table 17: Independent Recyclers - Estimate of Non-County Program Related Fire Debris Recovery¹

Facility	Concrete	Metal	Vegetative	Landfill Disposal	Total Tons
LTS	36,199	241	5		38,338
Sycamore		689		27,179	27,868
Ramona		1		9,918	9,919
Romero	8,000				8,000
Ramona Transfer Station	8,000				8,000
Julian Recycling	3,824	173			3,997
Rural Bin Sites		2,014	825		2,839
Lakeside Land Company		2,200			2,200
Miramar			2	1,073	1,075
Otay				227	227
Total (Tons)	56,023	5,318	832	38,397	100,569
Overall Recycling Rate	62%				

(1) Figures were not available from J. Cloud and Hanson who handled a large portion of concrete and inert recycling.

LANDFILL USAGE AND SAVINGS

The 2003 firestorms generated a significant amount of debris. The Ramona, Miramar, Sycamore, and Otay Landfills received 58,993 tons of unincorporated fire-related debris from October 2003 to June 2004. The most tonnage was received from October to December 2003 (Table 18).

Table 18: Unincorporated Fire Tonnage by Quarter¹

Oct-Dec 2003	36,435
Jan- Mar 2004	15,954
Apr-Jun 2004	6,534
Total	58,923

(1) Includes tonnage allocated to El Cajon because the unincorporated area of Crest, which was hit particularly hard by the disaster, shares a zip code with El Cajon.

LANDFILL SAVINGS

The County-operated Fire Debris Removal and Recycling program saved 11,484 tons (54,330 cubic yards) of landfill space (Table 19). When combined with the independent recyclers, temporary C&D facilities and recovery efforts at the bin sites, the County was able to preserve 184,692 cubic yards (73,656 tons) of landfill space. It should be noted that the tonnage does not include concrete that was recycled at Hanson Aggregates and J. Cloud because the data was not available.

Table 19: Landfill Savings from County of San Diego and Independent Recycling for Firestorms 2003

	Concrete 1 CY = 0.6 Tons	Metal 1 CY = 0.15 Tons	Vegetation 1 CY = .54 Tons	Total Cubic Yards
County Debris Removal Programs	7,280	46,900	150	54,330
Independent Recycling Efforts	93,371	35,450	1,541	130,362
Total	100,651	82,350	1,691	184,692

CONCLUSION

While more than 43% was recycled, in the County fire response, a higher recycling rate could have been attained by maximizing the use of the existing recycling infrastructure. The high recycling rate of the independent recyclers shows that fire debris is highly recyclable, the public is willing to separate debris for recycling, recycling facilities exist that can process the debris and maximizing recycling can decrease program costs. It is recommended that the County develop a plan to include recycling in the event of any future disaster.