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UNINCORPORATED YOLO COUNTY

UNIVERSITY OF CALIFORNIA, DAVIS
SOURCE REDUCTION AND RECYCLING ELEMENT
FINAL DRAFT

FEBRUARY 1993

YOLO COUNTY DEPARTMENT OF PUBLIC WORKS
AND TRANSPORTATION
292 West Beamer Street
Woodland, CA 95695

EBA WASTECHNOLOGIES

Preliminary Draft

SOURCE REDUCTION AND RECYCLING ELEMENT

for

UNIVERSITY OF CALIFORNIA, DAVIS

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ENGINEERS & ENVIRONMENTAL CONSULTANTS

TABLE OF CONTENTS

SECTION 1

EXECUTIVE SUMMARY

The University of California, Davis (UCD) has prepared this Source Reduction and Recycling Element (SRRE) in accordance with Title 14, Chapter 9, Articles 6.1 and 6.2 of the California Code of Regulations (CCR). While UCD is not mandated by State law to prepare such a document, it has chosen to do so to demonstrate its commitment to comply with the spirit and intent of the Integrated Waste Management Act of 1989 (AB 939). In addition, UCD owns and operates its own refuse collection system and Class III landfill. All waste that is generated on campus is handled and disposed of by University personnel. Therefore, UCD has complete control of its waste stream and assumes full responsibility for all solid waste management planning that involves campus generated waste.

UCD has in place a variety of effective diversion programs that are now diverting 38.2 percent of the campus's solid waste away from landfill disposal. During the short-term planning period (through 1995), UCD intends to maintain these programs and thus continue to exceed the 25 percent diversion rate goal established by AB939. In the medium-term planning period (1995-2000), UCD intends to create additional and more comprehensive diversion programs to increase its diversion rate to an estimated 69% by the year 2000. It is currently the University's intent to accelerate some of the medium-term programs into the short-term planning period as it performs further analysis on available resources.

While UCD has made definitive recommendations for diversion programs in the short and medium term planning periods in this SRRE, the University reserves the right to make changes to this planning document as various influencing factors such as market conditions and technological advancements change. Should revisions be necessary, UCD will abide by the revision process described in Section 1.4.

It should be noted that UCD is located within Yolo County (a small portion of the campus is also located in Solano County). Therefore, this SRRE is to be included with Yolo County's SRRE for review and comment by the County's Local Task Force and the California Integrated Waste Management Board as specified by Section 18763 of the CCR.

1.1 OVERVIEW OF THE INTEGRATED WASTE MANAGEMENT ACT OF 1989 (AB 939)

The amount of solid waste generated in California, coupled with diminishing landfill space and potential adverse environmental impacts from landfilling, created an urgent need for state and local agencies to enact and implement an aggressive new integrated waste management program called Assembly Bill 939 (AB 939), the California Integrated Waste Management Act of 1989.

The goals of AB 939 are to:

- Have local governments develop and implement integrated waste management programs tailored to their individual needs.
- Increase the diversion of waste material from landfill disposal through source reduction, recycling, and composting.
- Ensure the efficient use of existing solid waste landfills.
- Ensure that new solid waste landfills decisions are made based on quantitative information generated by solid waste characterization studies.

1.1.1 Requirements

AB 939 requires both city and county governments to develop and implement solid waste management plans covering a 15-year projected period (through 2005). AB 939 also establishes both guidelines and deadlines for the required documents.

AB 939 requires that each incorporated city and county develop a plan that demonstrates how the jurisdiction will divert 25 percent of all solid waste from landfill disposal and transformation (incineration) by 1995 and 50 percent by the year 2000. This planning document is called a Source Reduction and Recycling Element (SRRE) and must be prepared in accordance with California Public Resources Code Sections 40900 et seq. Current law requires that the SRRE is to be adopted by the jurisdiction on or before July 1, 1991. However, legislation is being considered that would extend the due date to July of 1992. As of this writing, relatively few jurisdictions in the State have adopted their SRRE.

In addition, each county is required to develop a siting element and county-wide Integrated Waste Management Plan (IWMP). The Siting element shall provide information documenting that the County has a minimum of 15 years of combined permitted disposal capacity. If the County cannot meet the required 15 year minimum permitted disposal capacity, then the Siting Element shall identify solid waste management strategies for the transformation of disposal of excess solid waste. The Siting Element shall also provide some detailed information concerning the existing solid waste disposal facilities as well as any plans for expansions that may be necessary to meet the State's requirements for this element.

The County's IWMP shall consist of all the cities' SRRE's and Household Hazardous Waste Elements (HHWE's) prepared and submitted to the County; the County's SRRE and HHWE (for the unincorporated areas); a summary of the County's significant waste management issues and problems; and the County-wide Siting Element. Based on Yolo County's current landfill capacity situation, the IWMP is due on January 1, 1994.

1.1.2 Approval Process

The process by which the Source Reduction Recycling Element is approved by the local jurisdiction ensures opportunity for public comment. The first step is publication and circulation for comment of a preliminary draft element. Approval of the preliminary draft must be at a public hearing that is advertised in the local paper at least thirty days in advance of the hearing. The comment period on the Preliminary Draft Source Reduction Recycling Element is 45 days. Comments may be received in writing or orally at the public hearing. During this comment period, the State Integrated Waste Management Board and the County's Local Task Force (LTF) reviews and comments on the document.

Following the comment period on the preliminary draft element, a final draft element is prepared that addresses all comments received. This is sent to the LTF only for 15 days for review and comment. A second public hearing must be advertised at least 30 days in advance of the date at which time the local jurisdiction may approve the final draft element with changes per the comments received.

After the second public hearing, a Final Source Reduction Recycling Element is prepared and adopted at a third public hearing held by the local jurisdiction.

In summary, there are three points in the process at which the public may have direct input into the preparation of the Source Reduction and Recycling Element. They are:

- The public hearing approving the Preliminary Draft Source Reduction Recycling Element.
- The public hearing approving the Final Draft Source Reduction Recycling Element.
- The public hearing adopting the Final Source Reduction Recycling Element.

After each jurisdiction has approved and submitted their Source Reduction Recycling Element to the County, the County Board of Supervisors must hold a public hearing to approve the Integrated Waste Management Plan for the County. This document incorporates all the local jurisdictions' elements with the County's plan for the unincorporated area. When approved, it is submitted to the State of California Integrated Waste Management Board for approval. The California Integrated Waste Management Board (CIWMB) has 120 days from the date of receipt to approve or disapprove the plans. A notice of disapproval will include specific recommendations for correction.

1.1.3 Enforcement

At least every two years the CIWMB will review each city/county SRRE and hold a public

hearing in the local agency's jurisdiction (when possible). If the CIWMB determines that the city/county has failed to implement the programs and achieve the required diversion rates, the Board will issue an order of compliance with specific deadlines. Failure to comply can result in daily fines of up to $10,000 being imposed by the State.

1.1.4 Revision Process

After adoption of the Final Source Reduction Recycling Element by both the local jurisdiction and the State Board, the jurisdiction shall monitor the programs to be implemented in the element to document the amount of waste reduced as a result of the element. An annual report summarizing the jurisdiction's progress toward achieving the mandated goals shall be submitted to the State Board. This report shall serve as the basis for determining if revisions to the adopted element are necessary.

The annual report shall be submitted within 90 days of the anniversary date the Board approved the element. The contents of the annual report shall be based on data gathered during the year following the SRRE's adoption, or the most recent revision by the Board.

If, in the process of implementing the adopted Source Reduction Recycling Element the jurisdiction finds it necessary to revise the element, this may be done during or prior to the annual review of the SRRE. All revisions to the adopted SRRE must be submitted to the State Board for approval. Requests for revisions must address the reasons for the revisions. These may include:

- Monitoring of programs finds targeted materials are not being diverted from the waste in the quantities originally projected.
- Demographics of jurisdiction have changed, altering the waste stream.
- Data base used for adopted SRRE is found to be inaccurate.
- Implementation of programs/facilities cited in SRRE are delayed due to permitting, and/or funding.

Revisions to the adopted SRRE must be approved by the same process as adoption of the SRRE, as described in Section 1.1.2, above.

1.2 CURRENT WASTE GENERATION, DIVERSION, AND DISPOSAL CONDITIONS

As specified in Section 18722(a) of the CCR, each jurisdiction must prepare an initial solid waste generation study which provides data to allow a jurisdiction to fully understand, in quantifiable terms, its current solid waste disposal and diversion practices, as well as forecast future solid waste generation rates. UCD has conducted such a study and included it in this SRRE as Section 3 - The Solid Waste Characterization Component. This Solid Waste Characterization Component presents the findings of the solid waste generation study that was performed by EBA Wastechnologies in April of 1991 in accordance with Section 18724 of the CCR (included as Appendix A). The study was completed as a part of a regional study that included the Cities of Davis, Woodland, West Sacramento, and Winters, as well as the unincorporated area of Yolo County. This information was used as the basis for planning all future waste handling, disposal, and diversion programs outlined in the SRRE.

As mentioned, the University of California at Davis is located in the unincorporated area of Yolo County, but is being treated separately for purposes of assisting the County to comply with the requirements of AB 939. The reasons for this decision are due to the large amount of waste that the University generates relative to the remaining unincorporated County area (approximately 43% of the unincorporated area's disposed waste stream) and that the waste management methods that are used on the campus are very different from the other County areas.

1.2.1 Summary of Current Conditions

As shown in Table 1-1, the results of the study conclude that the University currently generates solid waste at a rate of 17,922 tons per year. Of that amount, approximately 38.3 percent of the material (6,870 tons per year) is being recycled, reused, or composted. Of the remaining material, 53.1 percent (9,508 tons per year) is being disposed of at the University's landfill located on the western edge of the campus and 4.3 percent (772 tons per year) is being incinerated. Consequently, the University's diversion efforts are already exceeding the 1995 diversion requirement of 25 percent.

Table 1-1. Summary of Current Solid Waste Disposal, Diversion and Generation Rates

Waste Type (Major Categories)	Disposed* (tons per year)	Diverted (tons per year)	Total Generated (tons per year)	Diversion Rate (% of total waste generated)
Paper	3,292	332	3,624	1.9
Plastic	903	0	903	0.0
Glass	186	186	372	1.0
Metal	177	230	407	1.3
Yard Waste	294	47	341	0.0
Other Organic Waste	3,197	2,940	6,137	16.5
Other Waste	1,316	0	1,316	4.3
Inert Waste	1,687	3,135	4,822	17.5
Total	10,280	6,780	17,922	38.3

*NOTE: Includes 772 TPY being transformed (incinerated)

It should be noted that a considerable portion of the University's current diversion comes from the recycling of construction and demolition debris such as concrete and asphalt, included as "Inert Waste" in Table 3-1 (representing a 17.5 percent diversion rate). UCD is aware that consideration is currently being given by State Legislature to eliminate these materials from inclusion in the diversion rate calculation. If such a change were to occur, the University's current diversion rate might be reduced to 25 percent.

One other material type that is a large contributor to the current diversion rate is manure (included in the "Other Organic Waste" category). Manure is a large component of the waste stream that is brought to the landfill; however, the material is composted and given to farmers and landscapers for use as a soil amendment resulting in a 16.5 percent diversion rate.

1.3 DIVERSION PROGRAMS SELECTED FOR THE SHORT- AND MEDIUM-TERM PLANNING PERIOD

UCD has carefully evaluated its existing diversion programs, as well as many new program alternatives. From this evaluation, UCD has selected a comprehensive set of waste diversion programs that will effectively divert a large percentage of the University's generated solid waste away from disposal in the UCD landfill. Described below are the programs that have been selected for continued operation and new implementation.

1.3.1 Source Reduction Programs

Provided below is a brief description of the selected source reduction programs. It should be noted that all of the selected source reduction programs will involve the continuation of existing programs. Due to the success of these programs and limited budget, no new program alternatives have been selected for implementation.

1.3.1.1 Bargain Barn

The Bargain Barn is located on campus at the Central Stores/Receiving Department and specializes in the sale of excess, surplus and used UCD property. This includes office equipment, furniture, computer equipment, laboratory equipment, and other miscellaneous equipment and supplies. Material sold through the Bargain Barn is UCD property that is no longer needed by an individual UCD department. Property sales are initially limited to other UCD departments for 30 days. After that time, they become available to the general public to purchase. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

1.3.1.2 Computing Service E-Mail System

Computing Services provides electronic mail service to UCD departments. This system significantly reduces the amount of paper utilized for inter-campus correspondence (as well as telephone calls). This system is expected to continue in operation through the short-term and medium-term planning periods with no substantive changes.

1.3.1.3 Inter-Departmental Programs

Several UCD Departments have in place organized source reduction programs. These are summarized below.

(1) Project Tree is a telecommunications program which encourages precycling of paper products, double-sided copying, electronic mail, and the re-use of paper as scratch paper. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

(2) VMTH Publication List Distribution VMTH periodically sends out a list of publications that eliminates the need for producing individual copies of all publications. Anyone interested in receiving a copy of a publication can order it from VMTH using the reference number provided on the publication listing. Appendix B is a copy of a recent list of publications.

1.3.1.4 Food Service Programs

Food Service and the Coffee House promote the re-use of beverage cups by offering a ten cent discount to customers who bring their own refillable cup. The Coffee House sold approximately 5,000 refillable cups in 1991. Assuming each was used three (3) times (2 refills), 10,000 disposable cups were not used. This program is expected to continue operation through the short-term and medium-term planning periods with not substantive changes.

1.3.1.5 ReproGraphics - Doublesided Copiers

ReproGraphics has purchased approximately 50 double sided copiers to encourage double-sided copying (out of a total of 125 machines). This represents approximately 40 percent of the total number of copy machines provided by ReproGraphics to UCD departments. This number is expected to increase as new double-sided copiers are purchased to replace older single-sided copy machines.

1.3.1.6 Central Stores/Receiving Reuse Program

Central Stores/Receiving reuses cardboard boxes, wood pallets, and polystyrene packing peanuts, and collects for reissue to UCD departments used inter-campus envelopes. In addition, Central Stores/Receiving supplies refilled laser toner cartridges for campus use. Also, Central Stores/Receiving stocks and issues products made of postconsumer waste, such as toilet tissue, reclaimed rubber doormats, copy paper, computer paper, and white mailing envelopes. The use of these items is promoted using fliers, in-person advocacy, and the Storehouse Catalog. These efforts are expected to continue through the short-term and medium-term planning periods with no substantive changes. Some enhancements to these efforts may be considered during this timeframe.

1.3.1.7 Quick Copy Doublesided Copying Service

Currently, Quick Copy purchases _____ of paper annually. Quick Copy now offers double-sided copying service to UCD departments. Since ReproGraphics instituted this service, 65 - 75 percent of all copying is double-sided. These efforts are expected to continue through the short-term and medium-term planning periods with a gradual increase in the percentage of copying that is done double-sided.

1.3.1.8 ReproGraphics Microfiche Service

ReproGraphics provides a microfiche service to eliminate the need to print large reports in hard copy on computer paper. This service is estimated to reduce the amount of computer paper waste by 55.5 million sheets per year. This represents approximately 300 tons of computer paper per year. This effort is expected to continue through the short-term and medium-term planning periods with no substantive changes.

1.3.2 Recycling Programs

Based upon the evaluation of the four recycling program alternatives presented in Section 5.4, UCD has selected **Alternative #2 ("Campus-Wide Recycling Program")**for implementation.

Description of Selected Recycling Program

Alternative #2 - Creation of centrally coordinated, campus-wide recycling program (Selected)

Presently, ASUCD Project Recycle and Physical Plant perform the majority of the recycling collection services that occur on campus. ASUCD in particular has developed a campus-wide source separated bin collection program for office paper, aluminum and glass. As described in Section 5.2, several other departments also have some recycling efforts going on within their offices or buildings, but most of these efforts are provided with collection support from ASUCD and/or Physical Plant staff. This alternative would involve expanding the existing programs campus-wide by adding collection bins and material types to improve participation and increase the quantities of materials collected. In addition, improved educational efforts to accompany the various collection efforts would be developed to increase awareness of the recycling programs and provide an understanding of how the programs work. In particular, areas of the campus currently not receiving recycling service would be identified and targeted for new programs.

To facilitate this alternative, one centralized coordination entity will assume responsibility for the coordination of all recycling programs occurring on campus. This entity will be charged with the task of aggressively seeking methods that will improve the efficiency of the existing programs, as well as develop new programs for areas of the campus that are currently not recycling. This alternative provides for a designated person, organization, or UCD department with overall coordination responsibility for all recycling occurring on campus and to ensure

consistency between departmental programs, compliance with fire laws, and fulfillment of reporting requirements to Yolo County and the California Integrated Waste Management Board (CIWMB). As such, this centralized entity will be involved with all equipment, staffing, operations, and capital investment recommendations associated with recycling programs. Most likely there will be other UCD departments, organizations, and associations providing recycling services under the general guidelines and performance specifications established by the central coordinating entity.

In those areas where recycling is already occurring, a review of the existing operating procedures and overall program effectiveness will be conducted to determine how diversion rates can be improved. Problems will be determined, solutions formulated, new equipment or facilities installed and/or procedures implemented (if necessary), and educational programs developed. Responsibility for implementing this alternative would most likely be shared by ASUCD, Physical Plant and some of the other UCD departments and organizations involved with recycling. These new initiatives would be done as the time of available staff and existing budgets permit.

Specific aspects of this program may include:

1) Providing recycling bins to areas of campus currently not serviced;

2) Providing additional recycling bins to selected areas of campus which currently have some service, but could use more;

3) Ensuring that a designated entity is responsible for regularly moving recycled material from recycling bins to the larger collection bins (custodial staff, volunteer, other UCD employee);

4) Developing a system to closely examine each existing recycling program and determine how to improve effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

5) Developing tailored educational programs for each recycling effort to increase effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

6) Coordinating the installation of new facilities, equipment and/or operational procedures in the Coffee House, residence halls, kitchens, administrative offices and other areas where larger scale recycling operations are in place that will improve program effectiveness. This could include items such as individual office mixed paper collection bins, chutes in residence halls for recyclable material, dedicated tools for sizing cardboard in areas where cardboard is generated and recycled, etc.

7) Increasing collection frequency by ASUCD and Physical Plant staff for recycling bins they service to ensure that bins always have available space and are clean.

1.3.3 Composting Programs

Being an agricultural university, UCD produces a number of compostable waste material types in large quantities (the most noteworthy being manure). After careful consideration of the existing composting and green-waste collection and handling operations that divert these material types, and an evaluation of a number of additional collection, processing, and siting alternatives, the following programs were selected for implementation.

1.3.3.1 Expanded Manure Composting Program

Manure currently composted is delivered to the site by Animal Science department workers. In collection alternative 1, Physical Plant solid waste crews now collecting waste for burial will dedicate one route to collecting manure, bedding straw and yard waste for burial with a route dedicated to collecting these materials for composting.

Manure from the animal science department is spread in six inch layers and turned or stirred three times per week or more often if needed to reduce spontaneous combustion dangers and to control fly breeding. When dry and "cool" the finished product is pushed into the pile and given without charge to the public and campus community members who wish to take it on a load your own basis. Two days per week solid waste workers assist with loading using a front loader.

Approximately 16.5 percent of the waste stream is diverted from burial by the present composting program. Additional diversion of manure (up to 28.2 percent of the waste stream) is possible with the selection of the alternative collection methods described above. However, due to the limited processing equipment, only manure, such as that available at the Equestrian Center or Avian Sciences could be added. In order to accommodate all of the additional manure a compost burner would need to be acquired. This is planned in the medium-term planning period.

1.3.3.2 Wood and Green Waste Chipping Program

Wood and green waste is currently being stockpiled in a separate area of the landfill. The potential composting of this material has been addressed. An alternative to composting would be to chip this material and use it as mulch within the University or sell it for transformation.

The waste generation analysis identified 660 tons per year of material that is potentially available for chipping.

A contractor with mobile equipment would chip the material for approximately $35 to $45 ton plus mobilization. This cost could be offset if the material is sold for transformation.

Due to the relatively small amount of material generated, the purchase of equipment at from $75,000 to $150,000 or more is not economical. The 660 tons of material could be processed at a cost of from $23,000 to $30,000 annually.

The University will use the material made available or the material may be given away free (or sold) or used for landfill cover if it passes state qualification guidelines for a suitable cover material.

1.3.4 Special Waste Programs

Provided below is a brief description of the selected special waste programs. It should be noted that all of the selected special waste programs will involve the continuation of existing programs. Due to the success of these programs and limited budgets, no new program alternatives have been selected for implementation.

1.3.4.1 Continue use of asphalt and concrete as roadbed material

As described in Section 7.2.5, concrete and asphalt are regularly generated wastes by private contractors and Physical Plant crews as they repair roads and engage in construction and demolition projects. This type of material is brought to the landfill separate from other types of waste and is stored in a designated area. Once at the landfill, the material is crushed by driving over it with heavy loading and grading equipment. Crushed material that is less than 6" in diameter is then used as a roadbase at the landfill. None of the concrete or asphalt (except that containing rebar or steel) is disposed of in the active area of the landfill.

This alternative program involves the continuation of the current program, with no substantive changes.

1.3.4.2 Continue source separation and special collection of scrap metals/white goods

As described in Section 7.2.3, Physical Plant provides an on-call collection service to the entire campus to collect large metal waste types. Typically, this includes metal furniture and equipment that can't be sold or given away by the UCD Bargain Barn, (piping, fencing, etc.). The material is brought to the landfill and stockpiled in large roll-off type debris boxes and is then periodically collected as scrap metal by a salvage company in the Sacramento area.

This alternative program involves the continuation of the current program, with no substantive changes.

1.3.4.3 Continue source separation, special collection, and processing of wood waste

As described in Section 7.2.4., in September, 1982, the Yolo County Health Services Agency approved a plan to recycle pallets and wood scrap at the campus landfill. In 1990, 523 tons of materials were diverted to the wood diversion area (demolition debris, stumps, etc.). The public is welcome to remove pallets, logs and scrap. With the installation of a computerized landfill

scale, it is possible to weigh the materials removed for re-use. When the pile is large enough, remaining brush and wood scrap will be given to a vendor with a mobile grinding operation (See Composting Component for additional details).

Some of the chipped wood waste (the wood that is relatively free of nails and contaminants) will be used as a ground cover as a part of the Wood and Green Waste Chipping program (see selected programs in the Composting Component - Section 6). The remaining chipped wood waste will most likely be sold (or given away) for use as a fuel in a cogeneration facility or industrial process.

1.3.4.4 Continue to salvage tires at landfill

As described in Section 7.2.2, tires are not allowed to enter the UCD landfill for disposal. However, occasionally tires are found in the disposed waste stream at the working face of the landfill. These tires are pulled from the waste and stored in a separate area at the landfill until a sufficient number has accumulated to justify delivery to a Sacramento firm.

This alternative program involves the continuation of the current program, with no substantive changes. No evaluation of this program has been performed since it is not optional.

1.4 DIVERSION RATE PROJECTIONS

Each of the programs selected for implementation (or continued operation) during the short-term and medium-term planning periods is intended to reduce the amount of solid waste that must be landfilled. Tables 4-6 (Source Reduction), 5-4 (Recycling), 6-2 (Composting), and 7-6 (Special Wastes) provide details on the materials and quantities that are expected to be diverted by each of the individual programs. The cumulative impact of these programs will achieve a net diversion rate of 25 percent or greater by 1995, and 50 percent or greater by the year 2000. Summarized below in Table 11-5 are the cumulative diversion rate projections for all of the selected diversion programs described in Sections 11.1 and 11.2.

It should be noted that the diversion rates shown in Table 11-5 assume that the waste stream composition remains constant over the timeframe considered, and thus the diversion rates will also remain constant.

Table 11-5. Projected Total Diversion from Selected Programs (Shown in % of total waste generated)*

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Source Reduction Programs:										
Total	2.1	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Recycling:										
Campus-Wide Program	2.9	2.9	2.9	2.9	2.9	5.0	7.1	9.2	11.3	13.3
Composting:										
Manure Composting	16.5	16.5	16.5	16.5	16.5	28.2	28.2	28.2	28.2	28.2
Wood Waste Chipping	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.7	3.7
Special Wastes:										
Scrap Metals	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Concrete & Asphalt	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Transformation:										
Wood Waste	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.4	1.4	1.4
Dead Animals	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.2	1.2
Total Diversion	38.2	40.9	40.9	40.9	40.9	61.0	63.1	65.2	67.3	69.3

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

SECTION 2

OVERVIEW OF UCD CAMPUS

The Davis campus lies adjacent to the City of Davis, 15 miles west of Sacramento and 72 miles northeast of San Francisco. With a total of 6,011 acres (including 5,142 acres at the main campus and 108 acres at the UCD Medical Center in Sacramento), it is the largest in acreage of the nine campuses of the University of California. There are 1,049 buildings with 6,282,929 assignable square feet, located primarily at the Davis campus. Outlying facilities include the Natural Land Reserves in the Sacramento Valley area; medical, clinical and academic buildings in Sacramento; a veterinary teaching and research center near Tulare; a marine research facility at Bodega Bay; and a branch of the College of Engineering's Applied Science department at the Lawrence Livermore Laboratory. UCD is the second largest of the UC campuses in budget and total expenditures and third in enrollment and assignable square feet.

Academic programs are administered through three Colleges (Agricultural and Environmental Sciences; Engineering; Letters and Science), four Divisions (Biological Sciences; Statistics; Computer Science; and Education), a Graduate Division, the Graduate School of Management, and the Schools of Law, Medicine, and Veterinary Medicine. Davis serves as the primary campus for the comprehensive University research programs administered through the Agricultural Facility at Davis, the Veterinary Medicine Teaching and Research Center near Tulare, the University of California, Davis, Medical Center in Sacramento, California Veterinary Diagnostic Laboratory System (on behalf of the State), and the Bodega Marine Laboratory. Continuing education is provided principally by University Extension, which enrolled students from all parts of California, the nation, and 41 foreign countries, in 2,667 programs.

The total operating budget (excluding extramural appropriations) for the Davis campus as of 1 July 1991 is $829,144,278, of which 38.4 percent is from the State of California's General Fund. The budget includes funds from fees and service charges generated by the Medical Center, clinical practice plans, and auxiliary enterprises, e.g. parking and student housing. Additional revenue comes from the Federal Government, endowments, extramural contracts, gifts and grants, etc. Student fees provide approximately 8.6 percent of revenues required for the 1991-92 campus budget.

An additional $30,352,146 is budgeted separately for Agricultural and Natural Science University-wide programs administered at Davis, including Cooperative Extension, Agricultural Field Stations, and other service and outreach units, such as 4-H and Integrated Pest Management. Twenty-one Cooperative Extension programs are coordinated within academic departments in the College of Agricultural and Environmental Sciences. Nine Agricultural Field Stations span the State of California from the Imperial Valley to Tulelake.

Three mandatory University-wide fees are assessed on all registered students at the University of California, Davis: the Educational Fee, the University Registration Fee and a surcharge for medical and law students. Educational and Registration Fees are used primarily to support student financial aid and the direct and indirect costs of student services programs. The $376 per student surcharge is General Fund income. In addition, students pay miscellaneous fees on campus to support student associations and student centers that are not supported by University-wide fees. For Davis students in 1991-92, these fees average $2,430 for undergraduates and $2,685 for graduates, exclusive of the surcharge.

On campus, student housing accommodates 3,638 undergraduate and graduate students in residence halls, and 676 student families in other housing on campus.

Table 2-1. Source of Funds

Budgeted Funds (Dollars in Thousands)	1990-91	1991-92
State of California (note 1)	$323,233	$317,538
Student Fees	$51,833	$71,554
Medical Center	$265,368	$309,844
Auxiliary Enterprises	$61,285	$51,353
Other (note 2)	$74,199	$78,855
Total Budgeted Funds	$775,918	$829,144
Contracts, Grants and Gifts (Dollars in Thousands)	**Actual 1990-91**	**Projected 1991-92**
U.S. Government	$121,348	$140,000
Other (note 3)	$75,424	$80,000
Total Contracts, Grants and Gifts	$196,772	$220,000
Total Source of Funds	$972,690	$1,049,144

Notes:

(1) Includes State General Funds and Special State Appropriations but not General Funded Student fees.

(2) Includes income from U.S. government appropriations, medical practice plans, endowments and Regents' funds (e.g.: overhead from contracts and grants).

(3) Includes State agreements, grants and private gifts.

Table 2-2. **Distribution of Budgeted Funds**

1991-92 by Programmatic Category (Exclusive of Contracts, grants and gifts Dollars in Thousands)	State General Funds	Other Budgeted Funds	Total Budgeted Funds
Instruction	$191,077	$46,060	$237,137
Research	$46,119	$8,019	$54,138
Medical Center	$11,241	$309,844	$321,085
Student Support	$2,236	$37,509	$39,745
Operations and Maintenance of Plant	$37,876	$3,590	$41,466
Academic Support	$17,881	$95,615	$113,496
Institutional Support	$11,977	$10,100	$22,077
Total Budgeted Funds	$318,407	$510,737	$829,144
1990-91 by Programmatic Category (Exclusive of Contracts, grants and gifts Dollars in Thousands)	**State General Funds**	**Other Budgeted Funds**	**Total Budgeted Funds**
Instruction	$188,486	$44,334	$232,820
Research	$45,027	$7,516	$52,543
Medical Center	$11,205	$265,368	$276,573
Student support	$1,954	$32,749	$34,703
Operations and Maintenance of Plant	$37,075	$2,256	$39,331
Academic Support	$28,027	$93,266	$121,293
Institutional Support	$11,326	$7,329	$18,655
Total Budgeted Funds	$323,100	$452,818	$775,918

Table 2-3. Enrollment

Annual Headcount Enrollment (average of three quarters)	Actual 1990-91	Projected 1991-92
General Campus:		
Undergraduates	18,022	17,410
Graduates	3,390	3,257
Subtotal	21,412	20,667
Health Sciences:		
Medicine	1,190	1,208
Veterinary Medicine	74	716
Subtotal	1,904	1,924
Total Campus Average Enrollment	23,316	22,591
Fall Quarter Enrollment	**Actual Fall 1990**	**Actual Fall 1991**
Lower Division	9,162	7,788
Upper Division	9,233	10,089
Graduate and Professional	5,503	5,425
Total Fall Enrollment	23,898	23,302
Additional Annual Enrollment (not included in above counts)	**Actual 1990-91**	**Projected 1991-92**
University Extension	48,904	46,500
Summer Sessions	5,750	6,344

Table 2-4. Personnel

Distribution of Budgeted Full-Time Equivalents (Exclusive of personnel funded from contracts and grants)	1990-91	1991-92
Academic Personnel		
Faculty	1,456	1,451
Teaching Assistants	392	392
Deans and Directors	38	40
Professional Researchers	370	368
Hospital Interns and Residents	322	342
Other Academics:		
General Campus	31	32
Health Science	65	67
Librarians	76	70
Continuing Education	11	11
Total Academic Personnel	2,761	2,773
Executive Positions	37	37
Staff Personnel	9,030	9,145
Total Budgeted Personnel (F.T.E.)	11,828	11,955

SECTION 3

SOLID WASTE CHARACTERIZATION COMPONENT

As specified in Section 18722(a) of the California Code of Regulations, each jurisdiction must prepare an initial solid waste generation study which provides data to allow a jurisdiction to fully understand, in quantifiable terms, its current solid waste disposal and diversion practices, as well as forecast future solid waste generation rates. This Solid Waste Characterization Component presents the findings of the solid waste generation study that was performed by EBA Wastechnologies in April of 1991 in accordance with Section 18724 of the CCR (included as Appendix A). The study was completed as a part of a regional study that included the Cities of Davis, Woodland, West Sacramento, and Winters, as well as the unincorporated area of Yolo County. This information was used as the basis for planning all future waste handling, disposal, and diversion programs outlined in the SRRE.

The University of California at Davis is located in the unincorporated area of Yolo and Solano Counties, but is being treated as a separate jurisdiction for purposes of complying with the requirements of AB 939. The reasons for this decision are due to the large amount of waste that the University generates relative to the remaining unincorporated County area (approximately 43% of the unincorporated area's disposed waste stream) and that the waste management methods that are used on the campus are very different from the other County areas.

3.1 SUMMARY OF CURRENT CONDITIONS

As shown in Table 3-1, the results of the study conclude that the University currently generates solid waste at a rate of 17,922 tons per year. Of that amount, approximately 38.2 percent of the material (6,870 tons per year) is being recycled, reused, or composted. The remaining 53.1 percent (9,508 tons per year) is being disposed of at the University's landfill located on the western edge of the campus and 8.7 percent (772 tons per year) is being disposed through transformation. Consequently, the University's diversion efforts are already exceeding the 1995 diversion requirement of 25 percent.

Table 3-1. Summary of Current Solid Waste Disposal, Diversion and Generation Rates

Waste Type (Major Categories)	Disposed (tons per year)	Diverted (tons per year)	Total Generated (tons per year)	Diversion Rate (% of total waste generated)
Paper	3,292	332	3,624	1.9
Plastic	903	0	903	0.0
Glass	186	186	372	1.0
Metal	177	230	407	1.3
Yard Waste	294	47	341	0.0
Other Organic Waste	3,197	2,940	6,137	16.5
Other Waste	1,316	0	1,316	0
Inert Waste	1,687	3,135	4,822	17.5
Total	10,280	6,870	17,875	438.2

It should be noted that a considerable portion of the University's current diversion comes from the recycling of construction and demolition debris such as concrete and asphalt, included as "Inert Waste" in Table 3-1 (representing a 17.5 percent diversion rate). Consideration is currently being given by State Legislature to eliminate these materials from inclusion in the diversion rate calculation. If such a change were to occur, the University's diversion rate might be reduced to 25 percent.

One other material type that is a large contributor to the current diversion rate is manure (included in the "Other Organic Waste" category). Manure is a large component of the waste stream that is brought to the landfill. Approximately 58 percent of which is composted and given to farmers and landscapers for use as a soil amendment, resulting in a 16.5 percent diversion rate.

A diversion rate of 2.9 percent is achieved through the more conventional diversion programs which target materials, such as paper, aluminum cans, and glass. Despite some level of success in this area, significant amounts of these types of materials are currently being landfilled as presented in Table 3-2.

Table 3-2 Recoverable Materials Currently being Disposed

Waste Type (Category and Subcategory)	Amount Currently Disposed (tons per year)
Paper	
Newspaper	271
Cardboard	729
High Grade	574
Mixed	560
Plastic	
PET	7
HDPE	24
Metals	
Bi-metal/tin cans	85
Aluminum cans	16
Ferrous metals	58
Glass	
CA Redemption	62
Other recyclable	79
Yard Waste	294
Total	2,759

These recoverable materials represent approximately 27 percent of the total material being disposed of in the University landfill on an annual basis.

3.2 METHODOLOGY FOR CONDUCTING WASTE GENERATION STUDY

Refuse generated on campus is collected by Physical Plant operations with the exception of waste from self-haul sources (i.e., school departments or facilities which haul their own waste to the landfill). The majority of waste entering the landfill from self-haul sources consists of materials that are stockpiled at the landfill for waste diversion. Methods for estimating the composition and quantities of waste disposed and diverted are summarized in the following sections.

3.2.1 Estimates of Disposed Waste Quantity and Composition

For purposes of the waste generation study, campus facilities serviced by Physical Plant operations were designated as being residential, kitchen, institutional, or agricultural waste sources. To facilitate the characterization of the different waste streams, Physical Plant personnel developed refuse collection routes to consolidate waste from the similar waste generation sources of the campus. These routes are not typically run day-to-day but were organized to provide the best possible planning data for the development of the SRRE and Household Hazardous Waste Element (HHWE). Table 3-3 contains a partial listing of campus facilities identified as being representative of residential, kitchen, institutional, or agricultural sources. These sources of waste generation were selected so as to provide representative data from as wide a spectrum of sources as possible, thus providing a reasonably accurate picture of the University's waste composition.

Table 3-3. Sources of Waste Generation Designated for Preparation of Waste Generation Study

Residential Sources	Food Processing Sources (Kitchen)	Institutional Sources	Institutional Sources	Agricultural Sources
Orchard Park	University Club	Telecommunications	Feed Mill	Grounds Trailers
Solano Park	Coffee House	Briggs Hall	Hopkins Poultry	Primate Center
Domes	Memorial Union	Hoagland Hall	Ag Service	Equestrial Center
Primero	Primero Housing	Viehmeyer Hall	WFB	ARS
Regan	Segundo Dining	Mann Laboratory	Ecology	VMTH
Segundo	Tercero Dining	Haring Hall	Airport	Cole Facility
Tercero	Medical Science Cafe	Health Center	Viticluture and Enology	Sheep and Beef Barns
Leach Hall	Silo Union	Ceus Hall	Hickey Gymnasium	
	Wyatt Pavilion	Asmundson Hall	Hart Hall	
	Memorial Union	Environmental Horticulture	Mrak Hall	
	Hickey	Meyer Hall	King Hall	
		EH&S	Voorhies Hall	
		Bainer Hall	Wickson Hall	
		Cushing Way	Sproul Hall	

Estimates of the composition of waste disposed were based on a limited sampling program conducted on April 17, 1991. A total of 8 samples were obtained from the sources designated above. The average sample weight was approximately 203 pounds. The quantity of waste generated from the designated waste sources was based on waste disposal data compiled by Physical Plant personnel.

3.2.2 Estimates of Diverted Waste Quantity and Composition

Estimates of the quantity and composition of waste diverted at the University were based on data provided by Physical Plant operations and campus personnel. Several campus waste diversion programs were identified and are summarized in subsequent sections of the SRRE.

3.2.3 Waste Generation Projections

Estimates of the quantity of waste generated over the next 15 years were based on UC Davis Planning and Budget Office campus population projections. The increase (or decrease) in the quantity of waste generated was assumed to be directly proportional to changes in campus population. Table 3-5 summarizes campus population projections.

TABLE 3-4. University of California at Davis Campus Population Projections

Year	General Campus	Health Sciences	Campus Enrollment	Campus Employees	Total
1986-87	17,904	1,349	19,253		19,253
1987-88	18,943	1,333	20,276	8,317	28,593
1988-89	19,944	1,324	21,268	8,816	30,084
1989-90	20,666	1,318	21,984	9,648	31,632
1990-91	21,962	1,338	23,300	10,085	33,385
1991-92	21,347	1,330	22,677	9,831	32,508
1992-93	21,416	1,346	22,762	9,850	32,612
1993-94	21,348	1,341	22,689	10,075	32,764
1994-95	21,708	1,336	23,044	10,300	33,344
1995-96	22,068	1,331	23,399	10,525	33,924
1996-97	22,428	1,326	23,754	10,750	34,504
1997-98	22,788	1,319	24,107	10,975	35,082
1998-99	23,148	1,319	24,467	11,200	35,667
1999-2000	23,508	1,319	24,827	11,425	36,252
2000-01	23,868	1,319	25,187	11,650	36,837
2001-02	23,868	1,319	25,187	11,650	36,837
2002-03	24,588	1,319	25,907	12,100	38,007
2003-04	24,948	1,319	26,267	12,325	38,592
2004-05	25,308	1,319	26,627	12,550	39,177
2005-06	25,676	1,319	26,995	12,630	39,625

3.3 DISPOSED WASTE CHARACTERIZATION SUMMARY

Results of the waste characterization study indicate that waste paper and "other organics" make up the largest percentage of discarded material in the waste stream. Discarded paper largely consists of cardboard, ledger paper, mixed waste paper, and paper contaminated with food products or otherwise nonrecyclable. Contaminated paper from facilities identified as institutional or kitchen sources accounted for 33 and 57 percent of discarded paper respectively.

"Other organics" make up approximately 31 percent of the campus disposed waste stream with agricultural crop residue accounting for 18 percent. Though only making up 3 percent of the disposed waste stream, food waste accounted for almost 22 percent of the waste disposed from kitchen sources and 10 percent from residential sources. Estimates of waste composition for the designated waste sources are summarized in Table 3-5. Estimates of the quantity of waste disposed by waste source is summarized in Table 3-6.

TABLE 3-5. WASTE COMPOSITION BY WASTE SOURCE (PERCENT BY WEIGHT)

WASTE TYPE	RESIDENTIAL SOURCES (Percent By Weight)	FOOD PROCESSING SOURCES (Percent By Weight)	INSTITUTIONAL SOURCES (Percent By Weight)	AGRICULTURAL SOURCES (Percent By Weight)	TOTAL WASTE (Percent By Weight)
PAPER					
Newspaper	5.2	1.4	2.7	1.6	2.6
Corrugated	11.5	10.2	7.9	4.7	7.1
High Grade	2.2	0.7	6.3	4.8	5.6
Mixed	10.4	4.9	5.7	3.6	5.4
Cont. Paper	11.9	23.0	13.8	7.1	11.3
PLASTIC					
PET	0.5	0.0	0.0	0.0	0.1
HDPE	0.8	0.2	0.2	0.0	0.2
Pigmented HDPE	0.8	0.6	0.5	1.0	0.5
PS	0.5	0.0	0.3	0.3	0.3
Film	2.5	4.5	3.0	3.2	2.6
Other Plastic	4.4	3.5	5.3	7.0	5.0
GLASS					
CA redemption	1.9	1.4	0.6	0.2	0.6
Other recyclable	3.1	0.7	0.6	1.0	0.8
Non-recyclable	0.6	0.0	0.5	0.3	0.5
METAL					
Aluminum cans	0.2	0.3	0.2	0.2	0.2
Bi-metal/tin	1.8	3.8	1.0	0.8	0.8
Ferrous metal	1.4	0.0	0.5	0.6	0.6
Non-ferrous metal	0.9	0.1	0.1	0.1	0.2
White goods	0.0	0.0	0.0	0.0	0.0
YARD WASTE					
Grass, leaves	0.0	15.0	2.5	0.0	1.2
Prunings	0.1	2.1	2.0	2.8	1.7
OTHER ORGANIC					
Food	10.2	21.8	4.3	0.2	3.0
Tires	0.0	0.0	0.0	0.0	0.0
Rubber	0.1	0.1	1.3	3.2	1.3
Wood waste	0.0	1.7	4.3	0.0	3.3
Wood (press board)	0.0	0.0	0.2	0.0	0.1
Ag crop residue	0.0	0.0	0.0	0.0	0.0
Manure	0.0	0.0	21.3	37.4	20.5
Disposable diapers	7.6	0.0	0.4	0.0	0.9
Textiles, leather	7.6	0.3	1.4	1.5	1.8
OTHER WASTE					
Asphalt/Concrete	0.0	0.0	0.0	0.0	0.0
Inert solids	7.0	2.9	3.3	0.1	3.0
Composite materials	1.9	0.0	0.5	0.0	0.5
HHW matt/container	2.8	0.0	0.0	0.1	0.2
Misc.	2.1	0.6	1.5	1.7	1.5
SPECIAL WASTE					
Ash	0.0	0.0	0.0	0.0	0.0
Medical Waste	0.0	0.0	7.5	16.3	7.5
Auto Shredder	0.0	0.0	0.0	0.0	0.0
Auto bodies	0.0	0.0	0.0	0.0	0.0
Bulky waste	0.0	0.0	0.0	0.0	5.2
Other special	0.0	0.0	0.0	0.02	0.0
Construction/Demolition	0.0	0.0	0.0	0.0	3.7
TOTAL	100.0	100.0	100.0	100.0	100.0

TABLE 3-6. ESTIMATES OF QUANTITY OF DISPOSED WASTE BY WASTE SOURCE

WASTE TYPE	RESIDENTIAL SOURCES (TONS/YEAR)	KITCHEN WASTE (TONS/ YEAR)	INSTITUTIONAL SOURCES (TONS/YEAR)	AGRICULTURAL SOURCES (TONS/YEAR)	OTHER SOURCES (TONS/YEAR)	TOTAL WASTE GENERATED (TONS/YEAR)	PERCENT WASTE (BY WEIGHT)
PAPER							
Newspaper	41	11	161	58	0	271	2.6
Corrugated	91	80	384	173	0	729	7.1
High Grade	18	6	373	177	0	574	5.6
Mixed	83	38	307	132	0	560	5.4
Cont. Paper	94	181	622	261	0	1,158	11.3
PLASTIC							
PET	4	0	1	1	0	7	0.1
HDPE	6	1	15	2	0	24	0.2
Pigmented HDPE	7	5	6	37	0	55	0.5
PS	4	0	15	13	0	32	0.3
Film	19	36	101	116	0	271	2.6
Other Plastic	35	28	196	255	0	514	5.0
GLASS							
CA redemption	15	11	27	9	0	62	0.6
Other recyclable	25	5	10	38	0	78	0.8
Non-recyclable	4	0	29	13	0	46	0.5
METAL							
Aluminum cans	1	2	6	6	0	16	0.2
Bi-metal/tin	14	30	12	28	0	85	0.8
Ferrous metal	11	0	24	22	0	58	0.6
Non-ferrous metal	7	1	8	2	0	18	0.2
White goods	0	0	0	0	0	0	0.0
YARD WASTE							
Grass, leaves	0	118	0	0	0	118	1.2
Prunings	0	17	55	104	0	176	1.7
OTHER ORGANIC							
Food	81	172	47	8	0	308	3.0
Tires	0	0	0	0	0	0	0.0
Rubber	1	1	19	118	0	138	1.3
Wood waste	0	14	328	1	0	343	3.3
Wood (press board)	0	0	15	0	0	15	0.1
Ag crop residue	0	0	0	0	0	0	0.0
Manure	0	0	733	1,373	0	2,107	20.5
Disposable diapers	60	0	37	0	0	97	0.9
Textiles, leather	60	3	69	57	0	189	1.8
OTHER WASTE							
Asphalt/Concrete	0	0	0	0	0	0	0.0
Inert solids	56	23	231	3	0	313	3.0
Composite materials	15	0	41	0	0	56	0.5
HHW matt/container	22	0	0	2	0	25	0.2
Misc.	16	5	67	62	0	150	1.5
SPECIAL WASTE							
Ash	0	0	0	0	5	5	0.0
Medical Waste	0	0	170	597	0	768	7.5
Auto Shredder	0	0	0	0	0	0	0.0
Auto bodies	0	0	0	0	0	0	0.0
Bulky waste	0	0	0	0	532	532	5.2
Other special	0	0	0	1	0	1	0.0
Construction/Demolition	0	0	0	0	381	381	3.7
TOTAL	792	790	4,112	3,669	918	10,281	100.0

3.4 DIVERTED WASTE SUMMARY

Waste reduction, recycling, and composting at the University is achieved through a variety of programs developed through the Associated Students of UCD (ASUCD), Physical Plant operations, and individual campus department efforts. Programs include student housing recycling; campus paper, aluminum, and glass recycling; and composting programs conducted at the landfill and pilot demonstration projects.

In addition to the campus diversion programs, Physical Plant operations divert a considerable portion of the waste stream through recovery programs at the UCD landfill. The majority of waste brought to the landfill by self-haul sources, consisting of manure, wood waste, and metals, are composted or stockpiled for waste diversion. Inert waste such as concrete, asphalt, and dirt are also reused by Physical Plant operations as road bed material or as landfill daily cover. A detailed summary of these programs are located in Sections 5 and 6 of the SRRE.

A summary of the quantities of waste diverted by waste type is located in Table 3-7. A detailed breakdown of the quantity of material diverted by waste type and the overall percent contribution to waste diversion is located in Table 3-8.

TABLE 3-7. Waste Diversion Summary

WASTE TYPE	DIVERSION (TPY)	TRANSFORMATION (TPY)	TOTAL
Cardboard	141.5	0.0	141.5
Mixed paper	190.1	0.0	190.1
Other glass	186.2	0.0	186.2
Scrap metals	228.0	0.0	228.0
Aluminum	1.6	0.0	1.6
Manure	2,940.0	0.0	2,940.0
Concrete/asphalt	3,135.0	0.0	3,135.0
Wood	0.0	561.0	561.0
Dead animals	0.0	211.0	211.0
TOTAL	6,822.4	772.0	7,594.4

TABLE 3-8. TOTAL CURRENT WASTE GENERATED AND DIVERSION RATE

WASTE TYPE	WASTE DISPOSED (TONS/YEAR)	WASTE DIVERTED (TONS/YEAR)	TOTAL GENERATED (TONS/YEAR)	PERCENT WASTE (TONS/YEAR)
PAPER				
Newspaper	271.3	82.7	271.3	0.0
Corrugated	729.0	141.5	870.5	0.8
High Grade	573.5	53.2	573.5	0.0
Mixed	560.3	21.3	750.4	1.1
Cont. Paper	1,158.0	0.0	1,158.0	0.0
PLASTIC				
PET	6.9	0.0	6.9	0.0
HDPE	24.3	0.0	24.3	0.0
Pigmented HDPE	54.8	0.0	54.8	0.0
PS	31.5	0.0	31.5	0.0
Film	271.3	0.0	371.3	0.0
Other Plastic	513.9	0.0	513.9	0.0
GLASS				
Recyclable	140.7	186.2	326.9	1.8
Non-recyclable	46.3	0.0	46.3	0.0
METAL				
Aluminum cans	16.1	1.6	17.7	0.01
Bi-metal/tin	85.0	0.0	85.0	0.0
Ferrous metal	58.1	228.0	286.1	1.3
Non-ferrous metal	18.0	0.0	18.0	0.0
White goods	0.0	0.0	0.0	0.0
YARD WASTE				
Grass, leaves	118.4	0.0	118.4	0.0
Prunings	175.9	0.0	175.9	0.0
OTHER ORGANIC				
Food	307.9	0.0	307.9	0.0
Tires	0.0	0.0	0.0	0.0
Rubber	138.5	0.0	138.5	0.0
Wood waste	342.6	561.0	903.6	3.1
Wood (press board)	15.0	0.0	15.0	0.0
Ag crop residue	0.0	0.0	0.0	0.0
Manure	2,106.4	2,940.0	5,046.4	16.5
Disposable diapers	96.8	0.0	96.8	0.0
Textiles, leather	188.6	0.0	188.6	0.0
Dead animals	0.0	211.0	211.0	1.2
OTHER WASTE				
Asphalt/Concrete	0.0	3,135.0	3,135.0	17.5
Inert solids	312.9	0.0	312.9	0.0
Composite materials	56.4	0.0	56.4	0.0
HHW matt/container	25.4	0.0	25.4	0.0
Misc.	150.1	0.0	150.1	0.0
SPECIAL WASTE				
Ash	5.0	0.0	5.0	0.0
Medical Waste	767.8	0.0	767.8	0.0
Auto Shredder	0.0	0.0	0.0	0.0
Auto bodies	0.0	0.0	0.0	0.0
Bulky waste	532.0	0.0	532.0	0.0
Other special	0.8	0.0	0.8	0.0
Construction/Demolition	381.0	0.0	3,516.0	0.0
TOTAL	10,280.5	7,594.4	17,874.9	42.5

3.5 FIFTEEN YEAR WASTE GENERATION PROJECTIONS

As summarized in Section 3.2.1, waste generation projections for the University waste stream for the next 15 years are based on campus population projections. These projections include University estimates of the number of employees and students. Estimates of the projected quantity of waste generated are directly proportional to the forecasted percent change in the campus population. A summary of waste generation estimates is located in Table 3-9.

TABLE 3-9. Projected Waste Generation, Disposal, and Diversion

Year	Population	Waste Generated (TPY)
1990	33,385	17,922
1991	32,508	18,590
1992	32,612	18,547
1993	32,764	18,862
1994	33,344	19,089
1995	33,924	19,318
1996	34,504	19,530
1997	35,082	19,745
1998	35,667	19,962
1999	36,252	20,182
2000	36,837	20,404
2001	37,422	20,628
2002	38,007	20,855
2003	38,592	21,085
2004	39,177	21,317
2005	39,625	21,551

.5 tons/yr

SECTION 4

SOURCE REDUCTION COMPONENT

Source reduction is defined by the California Integrated Waste Management Board as "any action which causes a net reduction in the generation of solid waste. Source reduction includes, but is not limited to, reducing the use of nonrecyclable materials, replacing disposable materials and products with reusable materials and products, reducing packaging, reducing the amount of yard wastes generated, establishing garbage rate structures with incentives to reduce the amount of wastes that generators produce, and increasing the efficiency of the use of paper, cardboard, glass, metal, plastic, and other materials. Source reduction does not include diversion measures taken after the material becomes solid waste and enters the waste stream (such as recycling or composting)."

The Waste Generation Study conducted (see Section 3 for details) for the University of California, Davis, (UCD) identified target materials available for source reduction which include: paper, plastic, glass, metal, agricultural crop residue and other.

4.1 GOALS AND OBJECTIVES

UCD has been actively involved in source reduction programs for some time and will continue to operate these programs which promote actions that reduce the amount of waste generated. While the total diversion expected from these efforts is not large (approximately 2 to 3 percent), source reduction is considered to be a very important part of the University's overall waste management plan.

4.1.1 Source Reduction Programs Selected Implementation and Diversion Objectives

After giving consideration to the existing source reduction programs, and the additional source reduction program alternatives evaluated in Section 4.3, UCD has selected the programs presented in Table 4-1 for continued operation in the short-term and medium-term planning periods.

Table 4-1. Selected Source Reduction Program Alternatives

Selected Program	Program Description/Name
Existing Program #1:	Bargain Barn - Sale of used material
Existing Program #2:	Computing Services E-Mail System
Existing Program #3:	Inter-Departmental Programs
Existing Program #4:	Food Service Programs
Existing Program #5:	ReproGraphics - Doublesided Copiers
Existing Program #6:	Central Stores/Receiving Reuse Program
Existing Program #7	Quick Copy Double-Sided Copying Services
Existing Program #8	ReproGraphics Microfiche Service

Shown below in Table 4-2 is the anticipated diversion from the selected source reduction programs in 1992. Over time, these quantities are expected to increase in proportion to increases in UCD's total waste generation. Thus, the diversion rate associated with these efforts is expected to remain constant throughout the short-term and medium-term planning periods.

Table 4-2. Diversion Associated with Selected Source Reduction Programs

Selected Source Reduction Programs	Diverted Material Types	Estimated Amount Diverted (tons per year)	Percent of Total Waste Stream Diverted
Existing Program #1: Bargain Barn - Sale of used material	* Furniture * Equipment * Office Supplies	50.0	0.3%
Existing Program #2: Computing Services E-Mail System	* Office Paper	0.5	<0.1%
Existing Program #3: Inter-Departmental Programs	* Office Paper	0.5	<0.1%
Existing Program #4: Food Service Programs	* Beverage Cups	0.5	<0.1%
Existing Program #5: ReproGraphics - Doublesided Copiers	* Office Paper	50	0.3%
Existing Program #6: Central Stores/Receiving Reuse Program	* Office Paper * Cardboard * Pallets * Packing Materials * Toner Cartridges	5.0	<0.1%
Existing Program #7: Quick Copy Doublesided Copying Service	* Office Paper	78.0	0.4%
Existing Program #8: ReproGraphics Microfiche Service	* Computer Paper	300.0	1.7%
		486.5	2.7%

4.1.2 Targeted Materials for Source Reduction Programs

The material types targeted for diversion by the selected source reduction programs are listed in Table 4-3.

Table 4-3. Material Types Targeted by Selected Source Reduction Programs

Selected Source Reduction Programs	Targeted Material Types
Existing Program #1: Bargain Barn - Sale of used material	* Furniture * Equipment * Office Supplies
Existing Program #2: Computing Services E-Mail System	* Office Paper
Existing Program #3: Inter-Departmental Programs	* Office Paper
Existing Program #4: Food Service Programs	* Beverage Cups
Existing Program #5: ReproGraphics - Doublesided Copiers	* Office Paper
Existing Program #6: Central Stores/Receiving Reuse Program	* Office Paper * Cardboard * Pallets * Packing Materials * Toner Cartridges
Existing Program #7: Quick Copy Doublesided Copying Services	* Office Paper
Existing Program #8: ReproGraphics Microfiche Service	* Computer Paper

4.2. EXISTING CONDITIONS

Currently, there are a number of programs and activities in place at the University of California, Davis, that reduce or reuse waste materials. Existing activities include:

4.2.1 Procuring and using products containing recycled materials

UCD purchasing routinely solicits quotations for comparable products made of recycled materials and, when available and economically feasible, offers these recycled products as an alternative to the requesting department. As a part of this effort, Central Stores/Receiving stocks and issues products made of postconsumer waste, such as toilet tissue, reclaimed rubber door mats, photocopy paper, computer paper, and white mailing envelopes. The use of these items is encouraged by Central Stores/Receiving through fliers, in-person advocacy, and the storehouse Catalog, although higher costs of recycled materials sometimes prevents high usage. See Appendix A for listing of current items made from recycled materials that are in stock, as well as those with potential for stocking.

4.2.2 Replacing disposable materials/products with reusable ones

Central Stores/Receiving supplies refilled laser toner cartridges for campus use. Empty cartridges are picked up by Central Stores/Receiving staff and refilled by an off-campus vendor. These cartridges can also be reconditioned by the off-campus vendor. Central Stores/Receiving also stocks a variety of refillable pens and pencils for campus use. See Appendix A for current usage.

4.2.3 Reducing Hazardous Waste Generated

Environmental Health and Safety has developed and implemented a Hazardous Waste Source Reduction Review and Plan for the University of California, Davis.

4.2.4 Purchasing repairable products

The Bargain Barn sells excess University equipment, furniture, and supplies to UCD Departments thereby extending the useful life of these items, thus reducing the need for purchasing new items, as well as reducing the amount of material sent to the landfill for disposal. The excess UCD property is sold to UCD departments and the surplus is sold to the general public (if not sold within 30 days). Since fiscal year 1981-82, the Bargain Barn has sold between 1,024 and 3,331 items per year, having a combined annual sales value of $110,234 to $315,333. The combined weight of these items is not known.

4.2.5 Computing Services E-Mail Service

Computing Services provides an electronic mail service to many campus departments. Approximately 3,000 users are registered to use the service. This system significantly reduces the amount of paper used for correspondence.

4.2.6 Inter-Departmental Programs

1) Project Tree, a Telecommunications program, encourages precycling, double-sided copying, electronic mail, and the re-use of paper.

2) VMTH periodically sends out a list of publications that eliminates the need for producing individual copies of all publications. Anyone interested in receiving a copy of a publication can order it from VMTH using the reference number provided on the publication listing. Appendix B is a copy of a recent list of publications.

4.2.7 Food Service Programs

Food Service and the Coffee House promote the re-use of beverage cups by offering a ten cent discount to customers when they purchase a beverage in a refillable container. Coffee House has sold approximately 5,000 refillable coffee mugs.

4.2.8 ReproGraphics - double sided copier purchasing

Some departments, such as ReproGraphics, purchase photocopiers with double-sided copying capability. Presently between 45-50 percent of the copy machines ReproGraphics provides to departments are double-sided copiers.

4.2.9 Central Stores/Receiving Reuse Program

Central Stores/Receiving re-uses cardboard boxes, wood pallets, and polystyrene packing peanuts, and collects for re-issue to other UCD departments used inter-campus envelopes.

4.2.10 Quick Copy Double-Sided Copying Service

Quick Copy now offers a double-sided photocopying service to UCD departments. Since ReproGraphics instituted the service, 65-75 percent of all copying is double-sided. It is estimated that 78 tons of paper are saved per year by this service.

4.2.11 ReproGraphics Microfiche Service

ReproGraphics provides a microfiche service to eliminate the need to print copies of large computer reports. This service reduces computer paper waste by an estimated 55.5 million sheets per year. This represents more than 300 tons of computer paper.

In addition to these known source reduction efforts, many people within various UCD departments conduct similar source reduction and educational activities on their own.

Presented in Table 4-4 are the estimated amounts of the various material types that are being diverted as a result of the existing source reduction efforts. As can be observed by reviewing the table, the amount of material diverted from landfill disposal by most of these programs is not known since accurate records are not kept. Furthermore, in most cases it is not feasible to track and monitor these amounts, since it would require an inordinate amount of time and expense. However, in total, these efforts are believed to be diverting at least 2.1 percent of the total waste generated by UCD (approximately 378 tons per year). If it were feasible to track the impact of all programs, it is likely that the total diversion would be closer to 5 percent of the total waste generated.

Table 4-4. Diversion Associated with Existing Source Reduction Programs

Existing Source Reduction Programs	Diverted Material Type	Estimated Amount Diverted (tons per year)	Percent of Total Waste Stream Diverted
Existing Program #1: Bargain Barn - Sale of used material	* Furniture * Equipment * Office Supplies	Unknown	---
Existing Program #2: Computing Services E-Mail System	* Office Paper	Unknown	---
Existing Program #3 Inter-Departmental Programs	* Office Paper	Unknown	---
Existing Program #4: Food Service Programs	* Beverage Cups	Unknown	---
Existing Program #5: ReproGraphics - Double-sided Copiers	* Office Paper	Unknown	---
Existing Program #6: Central Stores/Receiving Reuse Program	* Cardboard * Pallets * Packing Material * Toner Cartridges	Unknown	---
Existing Program #7: Quick Copy Double Sided Copying Service	* Office Paper	78	0.4%
Existing Program #8: ReproGraphics Microfiche Service	* Computer Paper	300	1.7%
		378 (known)	2.1%

4.3. EVALUATION OF NEW SOURCE REDUCTION PROGRAM ALTERNATIVES

In addition to the continuation of the existing programs presented in Section 4.2, there are several other program alternatives available to accomplish additional source reduction. This section presents evaluations of those additional source reduction programs that are worthy of consideration at the University of California, Davis. Specified California Integrated Waste Management Board criteria has been used in the evaluation of each program.

These new source reduction alternatives under consideration fall into four categories: 1) rate structure modifications; 2) economic incentives; 3) technical assistance; and, 4) regulatory programs. Rate structure modifications provide financial incentives to reduce the amount of solid waste generated on campus through the implementation of disposal fees. Economic incentives are methods in which UCD can implement to encourage the development of increased source reduction practices in departments through financial incentives. Technical assistance programs educate departments to recognize and reduce waste at its source. Regulatory programs refer to practices, policies, and procedures that may be adopted by UCD to mandate reduced waste generation.

The new source reduction program alternatives evaluated in this section are listed below:

Rate Structure Modifications

- Alternative 1 Recharge Rate Structure for Refuse Collection

Creation of Economic Incentives

- Alternative 2 Subsidize Source Reduction Efforts
- Alternative 3 Expand Bargain Barn Operations

Technical/Instructional/Promotional Alternatives

- Alternative 4 Waste Evaluations and Waste Minimization
- Alternative 5 Educational Programs
- Alternative 6 Public Recognition and Awards

Regulatory Programs

- Alternative 7 Product Selection Considerations

These alternatives are described below and evaluated according to the California Integrated Waste Management Board specified criteria.

Alternative #1:
Recharge Rate Structure for Refuse Collection

This alternative involves UCD creating a refuse collection rate structure and beginning to charge UCD departments a refuse collection fee. To encourage source reduction, the rate structure would rise with increasing volumes or weights of the waste collected for disposal.

Effectiveness
It is believed that the implementation of such a fee would heighten departments' awareness of source reduction and recycling and would encourage them to actively participate in these programs. Consequently, it is expected that the amount of solid waste entering the campus landfill would be reduced. This would be especially true if the rate structure was based on the volume of waste collected.

Hazards
In some settings, this type of program can encourage illegal dumping. However, this is not considered to be a hazard at UCD.

Ability to Accommodate Change
Limited user fees are now charged to some campus auxiliary activities at this time. It is proposed that a similar rate schedule be implemented for this program.

Consequences on Waste Stream Composition
This program should reduce the amount of solid waste generated and promote more source reduction and recycling activities in departments.

Ability to be Implemented
There may be a problem having a state-funded unit, i.e., Physical Plant Solid Waste Section, charge for services it provides (after review and approval by the Budget Office). This involves major restructuring of the Operation and Maintenance of Plant budgeting formulas.

Need for Facilities
Present facilities should suffice, however, more space for recycling operations may be needed. See the Recycling Component.

Consistency with Local Policies, Plans and Ordinances
This alternative consistent with University policy, but involves major restructuring of the Operation and Maintenance of Plant budgeting formulas.

Institutional Barriers to Implementation
Departments may not support the implementation of this alternative. Historically, a switch to a system which charges for services that were previously provided to UCD departments for free have not been well received. It is anticipated that such a reaction will be amplified should this alternative be implemented during a period of fiscal constraint.

Costs
Costs for implementation of this alternative are not known at this time and would require a detailed study and analysis to determine. Since the likelihood of this alternative is considered remote, such a study will not be conducted at this time and cost estimates therefore cannot be provided.

Public Acceptance
Ideally, campus acceptance would improve the chance for success of this alternative. Perhaps include the reasons for implementing this charge within some of the educational activities addressed in the Education Component.

Regional Applicability
If implemented, all UCD departments, regardless of fund source, should be required to participate.

Alternative #2:
Subsidize Source Reduction Efforts

This alternative involves subsidizing the implementation of Alternative 1 to partially offset the cost of purchasing recycled products in order to make them more price competitive with products made from virgin materials. This could be accomplished for recycled products bought through the Storehouse.

Effectiveness
Should result in campus departments purchasing more products with recycled content.

Hazards
None known at this time.

Ability to Accommodate Change
Some recycled products are presently available in Central Stores/Receiving. Mechanisms are already in place to put additional recycled products into stock. The Purchasing department routinely asks for recycled product bids on all Requests for Quotations.

Consequences on Waste Stream Composition
More materials with a recycled content would enter the waste stream.

Ability to be Implemented
Requires thorough evaluation in order to comply with Federal Laws and University Policies.

Need for Facilities
Present facilities should suffice.

Consistency with Local Policies, Plans and Ordinances
This alternative is not consistent with University Policies.

Institutional Barriers to Implementation
Dependent upon University policy (See "Ability to be Implemented").

Costs
Unavailable at this time.

Public Acceptance
UCD campus departments must agree to purchase products with recycled content.

Regional Applicability
Applicable to all campus departments.

Alternative 3:
Expand Bargain Barn Operations

The Bargain Barn sells excess UCD equipment, furniture, and supplies to other UCD departments, thus extending the useful life of these items and reducing the need for purchasing new items. If not purchased by UCD departments, the surplus property is then made available to the general public. Materials not sold are collected by Physical Plant and taken to the landfill. Material with a high metal content is salvaged. This alternative involves expanding the existing operation through the acquisition of more storage space, greater advertising, and a more aggressive approach to acquiring surplus UCD property.

Effectiveness
Departments are currently reselling items through Bargain Barn. Between 1,000 to 3,000 items per year are processed through the Bargain Barn. This alternative would increase the amount of material handled. No estimates available at this time.

Hazards
Not enough storage space at this time.

Ability to Accommodate Change
Use existing system already in place.

Consequences on Waste Stream Composition
Less items being transferred to landfills, many items reusable or repairable.

Ability to be Implemented
It is recommended that changes to UCD Policy and Procedure Manual, Section 350-80, to give Bargain Barn first right of refusal for all items to be salvaged or buried at the landfills. This change will require a larger Bargain Barn facility.

Need for Facilities
More storage space with an easier access is needed for Bargain Barn activities and operations for this to be a viable alternatives.

Consistency with Local policies, Plans, and Ordinances
This alternative is consistent with University Policy, however, changes to UCD Policy and Procedure Manual Section 350-80 is recommended.

Institutional Barriers to Implementation
Successful implementation will eventually require a larger facility. Such a facility may not be available.

Costs
Unavailable at this time.

Market Availability
Limited market for many items, more sources need to be located.

Public Acceptance
Widely used by campus, local community, national, and international personnel presently.

Regional Applicability
World-wide.

Alternative 4:
Waste Evaluations and Waste Minimization

This alternative involves conducting waste evaluations for individual UCD departments or building complexes to identify what types and amounts of waste are being generated, and then identifying and implementing minimization techniques such as increasing the use of electronic mail, scrap paper for scratch pads, and double-sided copying. Data collected may also be used for:

- Assessing and revising waste disposal recharge fees recommended in Alternative 1 (if implemented).
- Controlling banned wastes entering into the waste stream.
- Establishing a base from which to evaluate progress made through source reduction programs.
- Reporting to UCD departments.

Effectiveness
This alternative seeks to target a limited number of large waste generators, while keeping administrative burden and cost minimal. If successful, this alternative should result in a reduction in the amount of waste generated by those UCD departments targeted for waste evaluation and minimization efforts.

Hazards
None know at this time.

Ability to Accommodate change
Measures changes in the waste stream and the impact of source reduction programs.

Consequences on Waste Stream Composition
No direct effect on the waste stream, however, a secondary impact may be source reduction.

Ability to be Implemented
If staffing and budgets are allocated, this alternative can be implemented.

Need for Facilities
No facilities are required for this option.

Consistency with Local Policies, Plans, and Ordinances
This alternative is consistent with University Policies.

Institutional Barriers to Implementation
No institutional barriers are known to exist that would prevent implementation of this alternative.

Costs
Costs are unknown at this time.

Market Availability
No need for markets on this option.

Regional Applicability
All campus departments.

Alternative 5:
Educational programs - also refer to Education Component

Develop in-service training classes to educate departments on the need for and benefits of source reduction. Also provide on-campus and off-campus resources available to them that can assist them in their source reduction efforts and/or provide some information in one-time mailings to departments and, on an ongoing basis, to new University of California, Davis, hires at orientation.

Effectiveness
The effectiveness of this alternative will depend upon the degree to which the university can promote source reduction and recycling through its educational programs to the staff. This should results in increased awareness of source reduction and recycling.

Hazards
No hazards for this option.

Ability to Accommodate Change
To incorporate this into in-service training classes, flyers, UCD Dateline reports, and Cal Aggie articles should pose no problems.

Consequences on Waste Stream Composition
Aluminum cans, glass and plastic bottles, newsprint, and cardboard should be diverted from the waste stream into recycling stream.

Ability to be Implemented
Various ways of disseminating information to campus community. In-service training classes, flyers, UCD Dateline reports, and workshops can be developed.

Need for Facilities
None required for this option, existing facilities can be used.

Consistency with Local policies, Plans, and Ordinances
This alternative is consistent with University policy.

Institutional Barriers to Implementation
None on this option.

Costs
The in-service training classes should be no more expensive than current classes. Additional costs will be in the production of promotional flyers and handouts given at classes.

Market Availability
Not required for this option.

Public Acceptance
The educational programs and interesting/informative handouts should help convince the public of the need to source reduce and recycle.

Regional Applicability
The entire campus community.

Alternative 6:
Public Recognition and Awards

Feature individuals/departments who have made significant source reduction contributions in UC Davis Dateline and other University of California, Davis, publications or start a new Recycle publication for this purpose.

Effectiveness
The effectiveness of this alternative will depend upon the degree to which the University can promote source reduction and recycling through its educational programs to the staff.

Hazards
None created by this option.

Ability to Accommodate Change
Being an education institution, the University should be able to incorporate changes within many different and diverse programs. Enhancing the current programs already in place should also be easy to accommodate.

Consequences on Waste Stream Composition
This will have no impact on the waste stream.

Ability to be Implemented
This alternative can be implemented, if selected.

Need for Facilities
No need for facilities for this option.

Consistency with Local Policies, Plans, and Ordinances
Dependent upon State Law and/or University policy.

Institutional Barriers to Implementation
Dependent upon University policy and the availability of funding.

Costs
Costs for implementing this alternative are expected to be minimal. Exact costs will depend upon extent of awards allocated.

Market Availability
Markets are not required for this option.

Public Acceptance
Acceptance by campus community.

Regional Applicability
All campus departments.

Alternative #7
Product Selection Considerations

Additional products containing recycled material should be stocked at the Storehouse. This alternative involves specifying durability, recyclability, reusability, recycled material content, and unnecessary packaging as criteria considerations for awarding purchase orders and agreements for products. Cost and product quality, however, will be overriding considerations, especially during times of fiscal constraint. In addition, this alternative will also establish in "Requests for Quotations" for purchase orders and supply agreements a requirement that the supplier will accept the return of shipping materials, such as pallets, barrels, polystyrene peanuts, etc. Another aspect of this alternative will be to consider product bans on items that are disposable or difficult to recycle or reuse and have environmentally sound substitutes such as disposable pens, plastic food serving utensils, and plastic labware. This alternative will be particularly emphasized in those situations where the preferred products are available at the same price as the disposable and/or high waste content products.

Effectiveness
Being a teaching and research institution, any proposed product bans may not be an effective mechanism. The research community may be limited to using specific products until alternative products or procedures are found or made available. The mechanisms to enforce the ban may be difficult if at all possible.

Hazards
Unknown at this time.

Ability to Accommodate Change
As recyclable and reusable product selection increases, this alternative will increase in scope to include these new products.

Consequences on Waste Stream Composition
May increase the use of other products resulting in more waste or even hazardous waste being generated. Also more packaging will be generated if multiple products replace one or two that are currently used.

Ability to be Implemented
This alternative can be implemented so long as recyclable and reusable products are available, and the University's purchasing policies can impact manufacturers packaging techniques.

Need for Facilities
Non required for this option.

Consistency with Local Policies, Plans, and Ordinances
This alternative will not conflict with University policies or plans.

Institutional Barriers to Implementation
None.

Costs
Alternative products could cost the University more money. The proposed bans themselves should have only minimal administrative costs in nature.

Market Availability
There may be limited amounts of certain products available for users. The proposed bans themselves would require no market.

Public Acceptance
Products specified will be of a comparable quality. Therefore, public acceptance of this alternative is expected.

Regional Applicability
All campus departments.

4.4 SELECTION OF SOURCE REDUCTION PROGRAM ALTERNATIVES

After giving consideration to the existing source reduction programs, and the new source reduction program alternatives evaluated in Section 4.3, UCD has selected the programs presented in Table 4-5 for implementation (or continued operation) in the short-term and medium-term planning periods.

Table 4-5. Selected Source Reduction Programs

Selected Program	Program Description/Name
Existing Program #1	Bargain Barn - Sale of used material
Existing Program #2	Computing Services E-Mail System
Existing Program #3	Inter-Departmental Programs
Existing Program #4	Food Service Programs
Existing Program #5	ReproGraphics - Double-sided copiers
Existing Program #6	Central Stores/Receiving Reuse Program
Existing Program #7	Quick Copy Double Sided Copying Service
Existing Program #8	ReproGraphics Microfiche Service

4.4.1 Description of Selected Source Reduction Program Alternatives

Provided below is a brief description of the selected source reduction programs. As can be observed from Table 4-2, all of the selected source reduction programs will involve the continuation of existing programs. Due to the success of these programs and limited budget, no new program alternatives have been selected for implementation.

Existing Program #1: Bargain Barn - Sale of Used material

The Bargain Barn is located on campus at the Central Stores/Receiving Department and specializes in the sale of excess, surplus and used UCD property. This includes office equipment, furniture, computer equipment, laboratory equipment, and other miscellaneous equipment and supplies. Material sold through the Bargain Barn is UCD property that is no longer needed by an individual UCD department. Property sales are initially limited to other UCD departments for 30 days. After that time, they become available to the general public to purchase. This program is expected to continue operation through the short-term and medium-term planning periods with not substantive changes.

Existing Program #2: Computing Services E-Mail System

Computing Services provides electronic mail service to UCD departments. This system significantly reduces the amount of paper utilized for inter-campus correspondence (as well as telephone calls). This system is expected to continue in operation through the short-term and medium-term planning periods with no substantive changes.

Existing Program #3: Inter-Departmental Programs

1) Project TREE is a telecommunications program which encourages precycling of paper products, double-sided copying, electronic mail, and the re-use of paper as scratch paper. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

2) VMTH periodically sends out a list of publications, thereby eliminating the need for producing individual memos on office paper. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

Existing Program #4: Food Service Programs

Food Service and the Coffee House promote the re-use of beverage cups by offering a ten cent discount to customer who bring their own refillable cup. The Coffee House sold approximately 5,000 refillable cups in 1991. Assuming each was used three (3) times (2 refills), 10,000 disposable cups were not used. This program is expected to continue operation through the short-term and medium-term planning periods with not substantive changes.

Existing Program #5: ReproGraphics - Double-sided Copiers

ReproGraphics has purchased double sided copiers to encourage double-sided copying. At present, approximately 40 percent (50 out of 125 machines) of the copy machines provided by ReproGraphics to UCD departments have double-sided copying capabilities. This number is expected to increase as new copiers are purchased to replace older machines.

Existing Program #6: Central Stores/Receiving Reuse Program

Central Stores/Receiving reuses cardboard boxes, wood pallets, and polystyrene packing peanuts, and collects for reissue to UCD departments used inter-campus envelopes. In addition, Central Stores/Receiving supplies refilled laser toner cartridges for campus use. Also, Central Stores/Receiving stocks and issues products made of postconsumer waste, such as toilet tissue, reclaimed rubber door mates, copy paper, computer paper, and white mailing envelopes. The use of these items is promoted using fliers, in-person advocacy, and the Storehouse Catalog. These efforts are expected to continue through the short-term and medium-term planning periods with no substantive changes.

Existing Program #7: Quick Copy Double Sided Copying Service

Quick Copy now offers double-sided copying service to UCD departments. Since ReproGraphics instituted this service, 65 - 75 percent of all copying is double-sided. These efforts are expected to continue through the short-term and medium-term planning periods with a gradual increase in the percentage of copying that is done double-sided.

Existing Program #8: ReproGraphics Microfiche Service

ReproGraphics provides a microfiche service to eliminate the need to print large reports in hard copy on computer paper. this service is estimated to reduce the amount of computer paper waste by 55.5 million sheets per year. this represents approximately 300 tons of computer paper per year. This effort is expected to continue through the short-term and medium-term planning periods with no substantive changes.

4.4.2 Reasons for Selecting source Reduction Program Alternatives

Presented below in Table 4-6 are the reasons UCD has selected (and not selected) the source reduction program alternatives considered for implementation in the short-term and medium-term planning periods.

Table 4-6. Reasons for Selecting Source Reduction Program Alternatives

Program Alternative	Selected	Reasons
Existing Program #1: Bargain Barn - Sale of used material	Yes	* Already in operation * Effectively diverts material for reuse
Existing Program #2: Computing Services E-Mail System	Yes	* Already in operation * Effectively reduces paper waste
Existing Program #3: Inter-Departmental Programs	Yes	* Already in operation * Effectively reduces paper waste
Existing Program #4: Food Service Programs	Yes	* Already in operation * Effectively reduces beverage cups in waste stream
Existing Program #5: ReproGraphics - Double-sided Copiers	Yes	* Already in operation * Effectively reduces paper waste
Existing Program #6: Central Stores/Receiving Reuse Program	Yes	* Already in operation * Effectively reduces cardboard, paper waste, and other packaging wastes
Existing Program #7: Quick Copy Double Sided Copying Service	Yes	* Already in operation * Effectively reduces paper waste
Existing Program #8: ReproGraphics Microfiche Service	Yes	* Already in operation * Effectively reduces paper waste
New Alternative #1: Recharge Rate Structure for Refuse Collection	No	* Implementation too difficult due to OMP budget restructuring
New Alternative #2: Subsidize Source Reduction Efforts	No	* Not consistent with University policy
New Alternative #3: Expand Bargain Barn operations	No	* Current operations limited to size of existing facility
New Alternative #4: Waste Evaluations and Waste Minimization	No	* Too costly
New Alternative #5: Educational Programs	Yes	* See Education Component (Section 8.0)
New Alternative #6: Public Recognition	Yes	* Implementation discussed in Education Component (Section 8)
New Alternative #7: Product Selection Considerations	Yes	* Already being done as a part of Existing Program #6

4.4.3 Diversion Anticipated from Selected Source Reduction Program Alternatives

Shown below in Table 4-7 is the anticipated diversion from the selected source reduction programs in 1992. These quantities are expected to increase in proportion to increases in UCD's total waste generation. Thus the diversion rate associated with these efforts is expected to remain constant throughout the short-term and medium-term planning periods.

Table 4-7. Diversion Associated with Selected Source Reduction Programs

Selected Source Reduction Programs	Diverted Material Type	Estimated Amount Diverted (tons per year)	Percent of Total Waste Stream Diverted
Existing Program #1: Bargain Barn - Sale of used and surplus material	* Furniture * Equipment * Office Supplies	50.0	0.3%
Existing Program #2: Computing Services E-Mail System	* Office Paper	0.5	<0.1%
Existing Program #3 Inter-Departmental Programs	* Office Paper	0.5	<0.1%
Existing Program #4: Food Service Programs	* Beverage Cups	0.5	<0.1%
Existing Program #5: ReproGraphics - Double-sided Copiers	* Office Paper	50	0.3%
Existing Program #6: Central Stores/Receiving Reuse Program	* Cardboard * Pallets * Packing Material * Toner Cartridges	5.0	<0.1%
Existing Program #7: Quick Copy Double Sided Copying Service	* Office Paper	78	0.4%
Existing Program #8: ReproGraphics Microfiche Service	* Computer Paper	300	1.7%
New Alternative #6: Public Recognition	* All Waste Type Categories	Unknown	
New Alternative #7: Product Selection Considerations	* All Waste Type Categories	Unknown	
		486.5	2.7%

4.5 IMPLEMENTATION OF SOURCE REDUCTION PROGRAMS

All of the selected source reduction program alternatives are already in operation. Therefore, implementation of these programs, for purposes of this SRRE, will involve the UCD departments conducting these programs continuing their operation in their current form.

4.6 MONITORING AND EVALUATION OF SELECTED SOURCE REDUCTION PROGRAMS

4.6.1 Methods to Quantify and Monitor Achievement of Objectives

Each UCD department or campus group that conducts a source reduction program will be asked to prepare regular reports that provide either actual or estimated tonnage figures for the amount of material being diverted as a result of their program (by individual material type). The report shall be prepared annually, at a minimum. In some cases, scales may be used (i.e. at the Bargain Barn). In other cases, where actual measurements are not possible (i.e. E-Mail System, doublesided copiers, etc.), estimates shall be made based upon a set of clearly stated assumptions.

4.6.2 Written Criteria for Evaluating the Programs' Effectiveness

In addition to providing quantitative information concerning a programs effectiveness, other criteria shall also be considered in an annual evaluation of each program's overall performance. This evaluation shall include a stated set of criteria, which may include answers to questions such as:

- Are stated diversion goals being met?
- Was the program implemented on schedule?
- Do people understand the concept of source reduction as advocated by the program?

These criteria shall be developed by the UCD department charged with the responsibility of overseeing the University's implementation of the programs defined in this SRRE (see Selected Recycling Alternative Program - Section 5).

4.6.3 Agencies, Organizations, Persons Responsible for the Programs' Monitoring, Evaluation and Reporting

Listed below in Table 4-8 are the entities responsible for performing the monitoring, evaluation and reporting for each of the selected source reduction programs.

Table 4-8

Selected Source Reduction Programs	Responsible Entity
Existing Program #1: Bargain Barn - Sale of used material	Central Stores/Receiving
Existing Program #2: Computing Services E-Mail System	Computing Services
Existing Program #3: Inter-Departmental Programs	Telecommunications/ VMTH
Existing Program #4: Food Service/Coffee House Cup Discount Program	Food Service
Existing Program #5: ReproGraphics - Doublesided Copiers	ReproGraphics
Existing Program #6: Central Stores/Receiving Reuse Program	Central Stores/Receiving
Existing Program #7: Quick Copy Doublesided Copying Service	Quick Copy
Existing Program #8: ReproGraphics Microfiche Service	ReproGraphics
New Alternative #6: Public Recognition	To be Determined
New Alternative #7: Product Selection Considerations	Central Stores/Receiving

4.6.4 Monitoring and Evaluation Funding Requirements

It is expected that the additional costs associated with monitoring and evaluating the performance of the source reduction programs by the various responsible entities will be minimal and will be incorporated into the total operational costs of the department.

4.6.5 Measures to be Implemented if there is a Shortfall in the Diversion Objectives

Should the selected source reduction programs fall short of the stated diversion rate objectives (as presented in Table 4-2), UCD may consider the development and implementation of regulatory programs and controls, including certain product bans, material type bans, mandatory waste reduction and reporting by UCD departments, and procurement requirements.

SECTION 5

RECYCLING COMPONENT

The California Integrated Waste Management Board defines recycling to be a process which reconstitutes materials recovered from the waste stream for reuse as raw materials in the manufacture of new products. Recycling is a set of interconnected activities that results in the use of materials from waste to create new materials that can be used for beneficial purposes. The steps in recycling include: separation, collection, processing, marketing and finally the manufacture of new products from the materials recovered in the waste stream. In addition to the efficient recovery and handling of materials, the success of recycling programs is dependent on promotion and education to stimulate participation.

The purpose of this Recycling Component is to provide information necessary to develop, and implement programs that will be supported by the UCD students, faculty, and staff and will assist in meeting the AB 939 diversion goals. This component describes existing recycling activities, evaluates new recycling alternatives, outlines those alternatives selected for implementation, provides the planning framework for implementing the programs as well as for developing effective monitoring and evaluation methods.

5.1 GOALS AND OBJECTIVES

Recycling programs will play a significant role in UCD's integrated waste management plan, as the University strives to achieve the AB 939 diversion goals. Summarized below are the details concerning the selected recycling program, diversion objectives, targeted material types, and market development objectives.

5.1.1 Recycling Program Alternatives Selected for Implementation and Diversion Objectives

After a careful evaluation of a number of recycling program alternatives, UCD has selected a program that involves expanding the existing recycling efforts through the creation of a campus-wide source separation recycling program that will be coordinated by one designated UCD department or campus organization (Alternative #2 - "Campus-Wide Recycling Program"). The program will build on existing recycling efforts and will rely on student, faculty, and staff participation in a system where targeted types of waste material (cardboard, paper, glass, aluminum, plastics) are separated from other waste types and placed in designated collection bins. UCD will make a significant effort to conveniently locate collection bins in most locations on campus. In addition, UCD will mount an aggressive educational campaign that will maximize awareness and participation in the program (see Section 8).

Specific actions and diversion rate objectives that are planned for the two short-term and medium-term planning periods are summarized below:

Objectives for Short-Term Planning Period

- Continue Existing Recycling Efforts
- Begin planning associated with the purchasing, locating and servicing of additional collection bins for recyclables as part of campus-wide program.
- Add equipment and labor as necessary to support expanded recycling efforts.
- Maintain 2.9 percent diversion rate through 1995 with existing recycling programs.

Objectives for Medium-Term Planning Period

- Centralize coordination of recycling programs with one designated entity.
- Incorporate existing recycling efforts into expanded campus-wide recycling program.
- Purchase, locate and service additional collection bins for recyclables.
- Add equipment and labor as necessary to support expanded recycling efforts.
- Achieve 13.3 percent diversion rate by the year 2000 through full implementation of the campus-wide recycling program.

5.1.2 Targeted Materials

The materials targeted for collection by the recycling programs are listed below:

- Cardboard
- High Grade Paper
- Mixed Paper
- Newsprint
- Glass Containers
- Aluminum Cans
- PET and HDPE Plastic
- Bi-metal/tin cans

Details concerning current diversion of these materials, as well as amounts being landfilled are presented in Tables 3-1 and 3-2 in Section 3.

5.2 EXISTING CONDITIONS

Many University departments and campus groups engage in recyclable material source separation programs. In some cases, the material is collected and then taken directly by department or group members to a buy-back or drop-off facility, or they deposit the material in collection bins provided by ASUCD or Physical Plant.

Archived correspondence indicates that UCD has attempted to recycle various materials since at least 1972. Currently, there are a number of independent recycling programs in operation.

The following subsections describe these existing programs, as well as provide some background and history of the efforts and resources developed over the years by staff and student groups. Staff groups include Central Stores/Receiving, Office of Environmental Health and Safety, Physical Plant and other departments such as ReproGraphics, Telecommunications and the Veterinary Medical Teaching Hospital. Student groups include student housing (SHEP), student family housing and the Associated Students of University of California, Davis (ASUCD). Recycling committees representing cooperative efforts of staff and student groups have existed for many years.

Presented in Table 5-1 are the estimated amounts of recyclable material currently being recovered by these existing recycling programs on an annual basis. In total, these efforts divert approximately 519.8 tons of material per year, which represents 2.9 percent of the total waste generated.

Table 5-1. Total Diversion Associated with Existing Recycling Programs

Material Type	Amount Collected (TPY)
Aluminum	2.0
Cardboard	141.5
Glass	186.2
Computer Paper	31.9
Mixed Office Paper	21.3
White Office Paper	54.2
Newsprint	82.7
Total	519.8

Summarized below are descriptions of each of the existing recycling programs. Data included in this section was provided by representatives associated with each recycling program. Where possible, information from years prior to 1990 is included to provide a frame of reference.

5.2.1 ASUCD Project Recycle

In the Spring, 1980, the ASUCD President approved the formation of a student group to study the energy situation at UCD, and to work towards the implementation of progressive energy steps on campus. The Energy Programs Task Force (EPTF) soon expanded to allow non-student members of the University community to work with students on a variety of energy projects. In implementing the resultant program suggestions, the Task Force dealt extensively with the UCD Administration, campus Physical Plant, the Housing Administration, and a variety of student groups. During this time, students were shown to be very important in bringing improvements in the UCD energy situation.

In the Spring, 1981, the ASUCD, assumed financial and administrative responsibilities for the Task Force. The purpose of the Energy Programs Task Force was to increase recycling and energy awareness of students on the Davis campus, to promote innovative recycling conservation and energy-related programs and projects, and thus to increase recycling volume and reduce general campus energy use.

During the year 1984-85, the Task Force began to focus more on its recycling programs than on general campus energy awareness. Increased cooperation and communication with Physical Plant and Davis Waste Removal Company helped recycling programs grow. The need was perceived to narrow the activities of the EPTF to building and expanding recycling programs, and expanding campus awareness of recycling opportunities. In Fall, 1985, the EPTF changed its name to Project Recycle in order to more effectively promote its programs. The purpose of Project Recycle is to maintain and expand existing campus recycling programs, promote innovative new projects, and to increase student, staff, and faculty awareness of UCD recycling options.

ASUCD Project Recycle has a coordinator and 12-15 part-time student employees working 60 hours per week to serve about 270 containers in one or more locations in 70 campus buildings to collect white office paper. In 1990, ASUCD Project Recycle serviced 110 locations in 53 buildings to collect office paper, glass and aluminum. In 1990, they collected 14 tons of glass, 1.6 tons of aluminum, and 82.4 tons of separated white, colored and computer papers.

ASUCD's stated objectives are:

- To coordinate and expand campus recycling programs.
- To increase student awareness of recycling opportunities on campus and in the Davis Community.
- To identify and establish new facets of the campus recycling program.
- To encourage recycling beyond the Davis campus.

The specific recycling programs currently provided by ASUCD are:

1) Campus paper recycling program (Newspaper, Office paper, Computer paper)
2) Coffee House recycling program (Aluminum, Glass, Compostable items)
3) Campus aluminum and glass program

5.2.2 Student Housing Drop-Off Facilities

As early as 1972, a Recycle Committee was meeting with Physical Plant administrators to secure support for a paper recycling program. Physical Plant provided four 10 cubic yard rear loader containers at selected locations to receive paper collected mostly from recharge operations such as Primero, Segundo and Tercero.

Correspondence between Physical Plant and Student Housing indicates that student housing groups have been recycling newspapers, cans and bottles since 1977. At that time, Sam Hart, a pioneer and innovator in recycling technologies for the campus and City of Davis, already was collecting recyclables from food service areas.

Later, SHEP (Student Housing and Energy Program) established programs in 65 student housing communities to encourage energy conservation and recycling. The educational focus of these programs emphasized the value of recycling, energy conservation and environmental awareness more than income generation. In 1989, residence halls turned in approximately 3,000 pounds of aluminum and used the $1,300 in income to support educational and social programming in the residence Halls.

Currently, students in residence halls recycle aluminum cans, newspapers, white or mixed paper, glass and plastic. Material is brought by resident students to centrally located collection bins placed on some floors and in lobby areas. The custodial staff regularly transfers material collected in the bins to larger storage containers located outside of the residence halls. Physical Plant staff then collects the recyclable material from these storage containers and transports it to the Davis Waste Removal Processing Facility. In addition, in 1990-91, 1,200 pounds of aluminum were turned in by housing staff to Davis Waste Removal for $775 redemption value. Many residence hall residents collect recyclable materials themselves and turn the commodities into various agencies to collect California Redemption money for their group. Consequently, the amount of money collected by housing staff has decreased.

Off campus residence hall recycling efforts (Cuarto) are served by Davis Waste Removal.

5.2.3 Physical Plant Sponsored Student Family Housing Drop-Off Facilities

Prior to 1980, Davis Waste Removal and Student Family Housing worked together in a pilot program to recycle cans, bottles, clean paper and flattened cardboard boxes.

The current recycling program in the two student family housing complexes began in Fall, 1989, when the University contracted with Davis Waste Removal to provide large, 90 gallon containers and collection services for newsprint, glass and aluminum recycling. This program was one of the first apartment complex programs installed by Davis Waste Removal. To reduce broken glass, odor and fly problems, used bins at the thirteen collections sites are replaced with clean bins weekly.

Beginning in Summer, 1991, Physical Plant began servicing the 90 gallon containers, collecting the full ones, and replacing them with clean, empty containers. Physical Plant Staff deliver the collected newspaper and mixed beverage containers to Davis Waste Removal who sort the materials. Housing and Physical Plant budgets shared the 90 gallon container purchase expense. Since the program does not include separation of California Redemption Glass from the collected glass, the program generates no income; however, approximately $7,200 in service fees to Davis Waste removal are avoided by using Physical Plant staff. 172 tons of glass were collected in 1990. 58 tons of glass were collected in the first four months of 1991.

5.2.4 Physical Plant Sponsored Mixed Paper Collection Program (Roberta Koehler)

Physical Plant staff regularly collect paper and cardboard that is source separated and put in 90 gallon containers or designated refuse collection bins. These collection containers can be found at a number of locations across the campus. The Physical Plant staff utilizes a front-end-loading vehicle for collecting material from the refuse collection bins (which is primarily cardboard/newsprint) and a flatbed truck for collecting the full 90 gallon containers (which primarily contain mixed waste paper and glass beverage containers). The locations where refuse collection bins are located include:

- Residence Halls
- Bookstore
- Coffee House
- Libraries
- King Hall Law School
- Central Stores
- News Room in Mrak
- Waste Water Treatment Plant Office
- Veterinary Medicine Teaching Hospital (VMTH)
- ReproGraphics
- University Club
- Thurman Lab
- Medical School
- Bulk Mail
- Kitchens
- Student Family Housing

In some cases, the Physical Plant is collecting the material that is collected through other university departments' or organizations' recycling programs.

5.2.5 ReproGraphics Recycling Program

ReproGraphics has contracts to recycle photographic chemicals, film and some papers. They continue to seek materials and procedures that produce fewer difficult waste materials.

5.2.6 Inter-Departmental Programs

(1) Veterinary Medical Teaching Hospital (VMTH) Recycling Program

Members of the VMTH staff have self-organized and conduct a number of recycling programs that target the following materials:

Mixed office paper is source separated by office workers and placed in designated bins. The paper is periodically collected by ASUCD staff to be recycled.

When ASUCD Project Recycle is unable to collect from VMTH due to work-load demands on campus, a VMTH staff member collects all paper - newsprint, colored and white - and delivers it to "Job's Daughters", a community service organization which conducts recycling programs. She estimates that she recycles approximately one ton of paper per month.

Staff members, on behalf of their children, collect aluminum cans in the office to raise money for school functions. These individuals collect cans on their own time. The custodial staff also sorts cans from the daily waste stream, which have been set aside by members of the VMTH staff.

The VMTH source separates cardboard and places it in containers that are located west and east of the building. These containers are serviced by Physical Plant collection crews.

Members of the Small Animal Nursing staff have self-organized and recycle all pet-food tin cans in the Small Animal Clinic.

The hospital generates a large quantity of recyclable plastic. However, since it is considered medical waste, it cannot be recycled. Several staff members continue to look into this issue and are attempting to arrive at agreements with the vendors who generate the materials (i.e. syringe covers) to somehow re-use them.

Styrofoam packing peanuts are re-used by the pharmacy and central service areas. On an irregular schedule, unused "peanuts" are packaged, placed on the loading dock and picked-up by Storehouse.

Staff members who use computer printers will occasionally volunteer to store the empty printer cartridges in their work area until they can find a vendor to re-use the empty cartridges. Storehouse has recently begun to accept empty cartridges on a regular basis.

Until approximately six months ago, the Radiology Department recycled all radiographic film and realized some compensation for the silver contained in the film. However, because of new hazardous waste regulations, they now pay a vendor to haul old film away from the hospital.

(2) Rec Hall Recycling Program

A small scale recycling program is conducted within Rec Hall. The program is run by A.C. Hannam and targets aluminum cans, white and colored office paper, and cardboard. Containers are situated in the building to provide a convenient place for occupants and visitors to drop aluminum cans, most of which were purchased in the vending machines. The cans are periodically taken to a buy-back facility in Davis where they are returned for their redemption value. Within the Rec Hall administrative offices, paper collection bins are provided to collect office paper. Separate bins are provided (and labeled) for white paper and colored paper. The bins are emptied by ASUCD Project Recycle staff. Cardboard is set aside from refuse and is placed in a separate container outside Rec Hall, where it is collected by Physical Plant staff.

(3) Project TREE

For years, Telecommunications had been recycling computer paper through Physical Plant and white paper and aluminum through ASUCD Project Recycle. Two Telecommunications Office employees began the Telecommunications Recycling and Environmental Efforts (TREE) after Earth Day 1990 to encourage recycling efforts in the department and to make recycling easy and habit forming. They allocated one student employee hour per week to empty bins.

5.2.8 Central Stores Receiving Purchasing Program

The Storehouse is a self-supporting service unit organized to provide repetitively used supplies to campus and Medical Center departments at the lowest possible price, minimizing University cost and effort in the process of ordering, receipt, storage, and payment of invoices. In the late 1970's, the Storehouse put recycled xerographic paper and several colored bond papers into stock. Campus use at that time was, as it is now, voluntary. These recycled products did not sell due to inferior quality and higher prices. Consequently they had to be liquidated at a substantial loss to the Storehouse.

During the past year, the UC Davis Storehouse has again attempted to stock and promote recycled products on campus. Items include xerographic paper, laserjet printer cartridges, toilet tissue, computer paper, envelopes, and door mats in addition to desk top and intermediate paper storage containers. While product quality and user demand have improved somewhat, higher prices and the University's current budget crisis discourage the majority of departments from using recycled products. When departments

request paper products through the Purchasing Department, requests for quotes automatically are solicited for like recycled products.

Project TREE encourages precycling or making decisions resulting in the least amount of waste. Double-sided copying, electronic mail and reusing paper for draft reports contribute to waste reduction and precycling. The biggest challenge is the lack of space in the department for recycling containers.

5.3. RECYCLING PROGRAM ALTERNATIVES

The UCD campus setting, existing programs, equipment and facility infrastructure, as well as the campus demographics present unique opportunities and challenges for recycling. As described in Section 5.2, a number of successful recycling programs are currently operational. However, a significant amount of recyclable material continues to find its way to the landfill, suggesting that there is an opportunity for improvement (See Table 3-2). Consequently, the University is very interested in establishing cost effective recycling programs that will increase the amount of recyclable material removed from the waste stream.

It is important to note that for any recycling program to be successful, it requires that people be involved and participate. In general, people (students, UCD employees, and campus visitors) will recycle if:

1) They understand what they're supposed to do.
2) They understand why it's important.
3) It is convenient.

Consequently, any recycling program at UCD must satisfy the following criteria to be successful:

- People must understand what material is recyclable.
- People must know where to take their recyclable material.
- People must understand how material is to be prepared before putting into collection bins (i.e. cleaned, sorted, sized, etc.)
- Bins or collection facilities must be readily accessible.
- Bins or collection points must be clean and regularly emptied.
- Tools necessary to prepare material for placing into collection bins must be readily available (i.e. knife to cut cardboard into manageable size, staple remover, etc.)

In addition, programs must be cost effective.

With these criteria in mind, the following recycling program alternatives have been identified as candidates for evaluation:

Alternative #1
Maintain existing programs and encourage the creation of new independent source separation programs supported by ASUCD or Physical Plant. (Not Selected)

This alternative would involve maintaining the existing programs in their current form and encouraging other campus departments and organizations (that are currently not recycling) to develop some sort of recycling program on their own. The "encouragement" would come in the form of general goals, policies, or directives from UCD's Chancellor. Each entity would be responsible for developing a program on their own, based upon the characteristics of its own waste stream, available resources and constraints. New programs would most likely involve the source separation of material types, such as aluminum cans, office paper, newspaper, glass, cardboard, and plastics. Volunteers and/or University staff would be used to move the collected material from inside buildings to designated containers located outside (or bottom floor) of buildings where it could be stored and collected. This would occur at the direction of the individual in charge of the department, office group or organization implementing the program. These new recycling efforts would probably need the support of Physical Plant or ASUCD to periodically pick up the materials that have been collected, brought outside the building and loaded into a larger storage container (supplied by ASUCD or Physical Plant).

Alternative #2
Creation of centrally coordinated, campus-wide recycling program (Selected).

Presently, ASUCD Project Recycle and Physical Plant perform the majority of the recycling collection services that occur on campus. ASUCD in particular has developed a campus-wide source separated bin collection program for office paper, aluminum and glass. As described in Section 5.2, several other departments also have some recycling efforts going on within their offices or buildings, but most of these efforts are provided with collection support from ASUCD and/or Physical Plant staff. This alternative would involve expanding the existing programs campus-wide by adding collection bins and material types to improve participation and increase the quantities of materials collected. In addition, improved educational efforts to accompany the various collection efforts would be developed to increase awareness of the recycling programs and provide an understanding of how the programs work. In particular, areas of the campus currently not receiving recycling service would be identified and targeted for new programs.

To facilitate this alternative, one centralized coordination entity will assume responsibility for the coordination of all recycling programs occurring on campus. This entity will be charged with the task of aggressively seeking methods that will improve the efficiency of the existing programs, as well as develop new programs for areas of the campus that are currently not

recycling. This alternative provides for a designated person, organization, or UCD department with overall coordination responsibility for all recycling occurring on campus and to ensure consistency between departmental programs, compliance with fire laws, and fulfillment of reporting requirements to Yolo County and the California Integrated Waste Management Board (CIWMB). As such, this centralized entity will be involved with all equipment, staffing, operations, and capital investment recommendations associated with recycling programs. Most likely there will be other UCD departments, organizations, and associations providing recycling services under the general guidelines and performance specifications established by the central coordinating entity.

In those areas where recycling is already occurring, a review of the existing operating procedures and overall program effectiveness will be conducted to determine how diversion rates can be improved. For example, at the Memorial Union Coffee House, a significant amount of cardboard was observed in the refuse collection bin, even though a designated cardboard recycling collection bin is located only a few feet away. Reasons for this type of problem would be determined, solutions formulated, new equipment or facilities installed and/or procedures implemented (if necessary), and educational programs developed. Responsibility for implementing this alternative would most likely be shared by ASUCD, Physical Plant and some of the other UCD departments and organizations involved with recycling. These new initiatives would be done as the time of available staff and existing budgets permit.

Specific aspects of this program may include:

1) Providing recycling bins to areas of campus currently not serviced;

2) Providing additional recycling bins to selected areas of campus which currently have some service, but could use more;

3) Ensuring that a designated entity is responsible for regularly moving recycled material from recycling bins to the larger collection bins (custodial staff, volunteer, other UCD employee);

4) Developing a system to closely examine each existing recycling program and determine how to improve effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

5) Developing tailored educational programs for each recycling effort to increase effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

6) Coordinating the installation of new facilities, equipment and/or operational procedures in the Coffee House, residence halls, kitchens, administrative offices and other areas where larger scale recycling operations are in place that will improve program effectiveness. This could include items such as individual

office mixed paper collection bins, chutes in residence halls for recyclable material, dedicated tools for sizing cardboard in areas where cardboard is generated and recycled, etc.

7) Increasing collection frequency by ASUCD and Physical Plant staff for recycling bins they service to ensure that bins always have available space and are clean.

Alternative #3

Establish a mixed waste material recovery operation at the landfill (Not Selected).

Another alternative that could recover a significant percentage of the waste stream involves establishing a mixed waste material recovery facility (MRF) at the landfill (or other location, conceivably). This type of facility could be constructed to increase UCD's current recycling diversion rate in lieu of Alternative 2 or 3, and would remove a percentage of the remaining recyclable material that is found in the waste stream as it enters the landfill. While some source separation should be done to involve that segment of the population that wants to recycle, this type of operation minimizes the amount of source separation to a level where it is most cost effective and places the responsibility for removing the remaining recyclables on the facility operator. This alternative is being considered for use in conjunction with the existing recycling programs (Alternative 1), and eliminates the need for implementing more aggressive source separation measures.

Mixed Waste MRF's are centralized receiving and distribution points that receive, separate, process, and market recyclable materials directly from the general waste stream. They have the ability to accept mixed waste without the need for prior sorting and to remove targeted recyclable material types. In addition, they may be operated in conjunction with source separation programs, and be used to process the collected recyclables. The primary advantage of a mixed waste MRF is its ability to recover and process a large percentage of materials without the need for separate collections and public education programs.

As mentioned, a mixed waste MRF can receive the waste stream as it is disposed without the need for prior separation. This removes the burden of source separation from the waste generator and the need for any separate collection system for source-separated materials, such as curbside programs.

Processing begins when the load arrives on the tipping floor. A primary sorter checks the load. Any potentially hazardous materials are removed, as are particularly bulky items such as appliances.

Incoming waste is deposited onto a conveyor system for both mechanized and manual separation of recyclable materials. Mechanized separation might consist of passing the material over a shaker screen or trommel to sort out fine materials, a magnetic separator to remove ferrous items, or an air classification system for targeted light materials. Manual separation involves sorters removing targeted items as they pass over the conveyor and placing these items into separate bins for further processing.

Materials are generally processed in the following ways:

- Bulky items, such as wood, white goods, or cardboard are pulled off and segregated prior to loading waste onto the conveyor.

- Paper, which often will arrive commingled, is pulled off the conveyor line at various points by manual sorters, depending upon the types of paper accepted, the system used, markets, and the baler. This material is then baled for shipment to a broker/processor/manufacturer.

- Steel cans are pulled off of the sorting conveyor line either manually, or using a magnet. They are then shredded or baled, depending on the processing specified by market conditions.

- Light aluminum and plastic can be pulled off the sorting conveyor line manually or by using either air classification or inclined sorting equipment.

- Glass is manually pulled off the sorting conveyor line and sorted by color, then stored for market.

Any residual organic materials coming off the end of the conveyor sorting line may be diverted to composting programs after screening, or transferred to the landfill for disposal.

Each of these alternative recycling programs is carefully evaluated in Section .

5.4 EVALUATION OF RECYCLING PROGRAM ALTERNATIVES

Alternative #1

Maintain Existing Programs and Encourage the Creation of New Independent Source Separation Programs Supported by ASUCD and Physical Plant.

Of the four recycling alternatives considered, this alternative is the least aggressive in terms of providing additional recycling services to UCD students, employees and administrative staff. This alternative involves the UCD Chancellor regularly requesting that all current recycling programs continue to operate and that those individuals not recycling make an effort to participate in these programs or develop some sort of source separation program on their own, in their office or facility. ASUCD and Physical Plant Staff will be directed to provide collection service to any new programs established. Most likely this will involve the collection of paper, cardboard and glass. As is currently done, ASUCD and Physical Plant will work together to determine how best to serve those conducting recycling programs.

Effectiveness

The current recycling programs divert 2.9 percent of the waste stream. It is believed that a well conceived message that is regularly communicated by the Chancellor directly to students, faculty, and staff will have a positive impact on participation and will increase the number of locations on campus where recycling services are available. Just how much of an impact it will have is difficult to determine now and will depend on how such messages are structured and disseminated, however, a reasonable estimate would be a 10 to 20 percent increase in the current level of recycling. This translates into a 0.3 to 0.5 percent diversion rate increase, increasing the total diversion related to recycling programs to 3.2 to 3.5 percent.

Hazards

The existing recycling programs have not posed any significant hazards (environmental, safety, health). Consequently, this alternative, which involves some expansion of the existing programs, is not expected to create any significant hazards.

Ability to Accommodate Change

The existing recycling programs can accommodate changes relatively easily, such as:

- adding or deleting material types as market forces change,
- increasing or decreasing frequency of bin collection as participation rates change,
- moving collection bins as necessary to adapt changing traffic patterns and population densities

Consequences on Waste Stream

This alternative involves the continuation and expansion of programs which remove paper products, glass, aluminum cans, and some other recyclable materials from the waste stream that is headed for landfill disposal. Removal of these material types has no significant impact on the remaining disposed waste in terms of how it is landfilled or how it acts over time once buried in the landfill.

Ability to be Implemented

Since this alternative involves continuation of the existing programs in their current form, with some new programs of a similar type being developed by other departments and organizations, this alternative can be implemented with little difficulty. However, it should be noted that the effectiveness of this alternative will be difficult to monitor since all of the programs are operated independently and no reporting structure is in place that serves to keep track of what is occurring. Consequently, this will be a problem in regularly quantifying the types and amounts of material that are being diverted from the waste stream (necessary for purposes of demonstrating achievement of AB 939 goals to Yolo County and the CIWMB). Furthermore, these existing programs rely heavily upon students. As a result of this dependence on students and their class schedules, programs are sometimes vulnerable to inconsistent pickups and service. Also, because ASUCD and Physical Plant both have significant responsibilities for operating the existing recycling programs, but have no direct reporting relationships, there sometimes is confusion over who is servicing (picking up) certain areas of campus.

Need for Facilities

This alternative will probably not require any additional equipment or facilities. Existing facilities provided by ASUCD, Physical Plant, and other private enterprises that support the collection efforts will most likely be sufficient.

Consistency with Local Policies and Plans

This alternative does not conflict with any UCD plans or policies.

Institutional Barriers to Implementation

There does not appear to be any institutional barriers to the implementation of this alternative. However, as noted above, the effectiveness of this alternative will be difficult to monitor since all of the programs are operated independently and there is not one reporting structure in place to keep track of what is occurring. Consequently, this will be a problem in regularly quantifying the types and amounts of material that are being diverted from the waste stream (necessary for purposes of demonstrating compliance with AB 939 requirements to Yolo County and the CIWMB).

Costs

This alternative involves the continued operation of a number of existing independent recycling programs that are managed by a variety of UCD departments and campus groups. In addition, some new programs are expected to be created. In most cases, the programs are relatively small in scope and costs are not accounted for. In these cases the associated costs are assumed to be zero (for purposes of evaluating this alternative relative to other alternatives under consideration). Only the ASUCD and Physical Plant programs involve significant amounts of labor and equipment and therefore comprise the bulk of the expenditures associated with implementing this alternative. Summarized below are the current annual expenditures associated with ASUCD's and Physical Plant's recycling efforts:

ASUCD	$25,463/Year
Physical Plant	$90,000/Year
Total	$112,500/Year

For purposes of evaluating this alternative, and comparing the associated costs to the other alternatives under consideration, the total annual expenditure figure shown above is assumed to be applicable to the upcoming year as well. Expenditures in future years are expected to increase at the same pace as the cost of living indexes. Assuming a diversion rate of 3.4% is achieved, this alternative will divert approximately 608 tons of material per year. This translates into a cost of $185.00 per diverted ton per year.

Market Availability

This alternative involves programs that collect various paper products, glass, aluminum, and some plastics. Currently, markets exist for all of these material types.

Public Acceptance

In general, people want to recycle. Consequently, this alternative is expected to continue to receive wide spread public acceptance and participation. In addition, it is believed that some additional campus groups and administrative offices will develop small scale recycling programs for their own. However, with a variety of organizations doing pick-ups, confusion sometimes occurs over how materials is to be source separated (different organizations have different rules).

Alternative #2

Creation of centrally managed, campus-wide recycling program (Selected).

Presently, ASUCD Project Recycle and Physical Plant perform the majority of the recycling collection services that occur on campus. ASUCD in particular has developed a campus-wide source separated bin collection program for office paper, aluminum and glass. As described in Section 5.2, several other departments also have some recycling efforts going on within their offices or buildings, but most of these efforts are provided with collection support from ASUCD and/or Physical Plant staff. This alternative would involve expanding the existing programs

campus-wide by adding collection bins and material types to improve participation and increase the quantities of materials collected. In addition, improved educational efforts to accompany the various collection efforts would be developed to increase awareness of the recycling programs and provide an understanding of how the programs work. In particular, areas of the campus currently not receiving recycling service would be identified and targeted for new programs.

To facilitate this alternative, one centralized coordination entity will assume responsibility for the coordination of all recycling programs occurring on campus. This entity will be charged with the task of aggressively seeking methods that will improve the efficiency of the existing programs, as well as develop new programs for areas of the campus that are currently not recycling. This alternative provides for a designated person, organization, or UCD department with overall coordination responsibility for all recycling occurring on campus and to ensure consistency between departmental programs, compliance with fire laws, and fulfillment of reporting requirements to Yolo County and the California Integrated Waste Management Board (CIWMB). As such, this centralized entity will be involved with all equipment, staffing, operations, and capital investment recommendations associated with recycling programs. Most likely there will be other UCD departments, organizations, and associations providing recycling services under the general guidelines and performance specifications established by the central coordinating entity.

In those areas where recycling is already occurring, a review of the existing operating procedures and overall program effectiveness will be conducted to determine how diversion rates can be improved. Problems will be determined, solutions formulated, new equipment or facilities installed and/or procedures implemented (if necessary), and educational programs developed. Responsibility for implementing this alternative would most likely be shared by ASUCD, Physical Plant and some of the other UCD departments and organizations involved with recycling. These new initiatives would be done as the time of available staff and existing budgets permit.

Specific aspects of this program may include:

1) Providing recycling bins to areas of campus currently not serviced;

2) Providing additional recycling bins to selected areas of campus which currently have some service, but could use more;

3) Ensuring that a designated entity is responsible for regularly moving recycled material from recycling bins to the larger collection bins (custodial staff, volunteer, other UCD employee);

4) Developing a system to closely examine each existing recycling program and determine how to improve effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

5) Developing tailored educational programs for each recycling effort to increase effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

6) Coordinating the installation of new facilities, equipment and/or operational procedures in the Coffee House, residence halls, kitchens, administrative offices and other areas where larger scale recycling operations are in place that will improve program effectiveness. This could include items such as individual office mixed paper collection bins, chutes in residence halls for recyclable material, dedicated tools for sizing cardboard in areas where cardboard is generated and recycled, etc.

7) Increasing collection frequency by ASUCD and Physical Plant staff for recycling bins they service to ensure that bins always have available space and are clean.

Effectiveness

The effectiveness of this alternative will depend upon the specific diversion goals established, and how successful ASUCD and Physical Plant are at achieving these goals. For planning purposes it is assumed that the diversion goal for this alternative will be 13.3% (2,377 tons per year). This is approximately five times the current diversion rate, and represents the recovery of approximately 75% of all potentially recyclable paper, glass, aluminum cans, food cans, and plastic.

Hazards

This alternative will involve placing more collection bins on campus. In addition, more collection routes will be run to service the outside storage containers. To the extent that these types of activities pose safety hazards, this alternative may increase the potential for accidents. However, a properly run program using trained personnel and well maintained equipment should not pose any significant hazards.

Ability to Accommodate Change

Since this alternative relies on the source separation of recyclables, the amount of equipment and labor necessary to operate the program is minimized. Consequently, programs are not capital intensive and can accommodate change fairly easily and with minimal cost. However, with several separate programs utilizing differing guidelines on how source separation should be done, the most difficult aspect of accommodating any changes necessary will be in affecting the public's involvement. By creating one central coordination entity, this problem should be eliminated. Once people are accustomed to the program in terms of materials collected and bin locations, it is difficult to change their behavior. However, effective educational programs and information should eventually make any changes necessary in public behavior possible.

Consequences on Waste Stream

This alternative involves the continuation and expansion of source separation programs which remove paper products, glass, aluminum cans, and some other recyclable materials from the waste stream that is headed for landfill disposal. Removal of these material types has no significant impact on the remaining disposed waste stream in terms of how it is landfilled or how it acts over time once buried in the landfill.

Ability to be Implemented

Successful implementation of this alternative will require some capital investment in new collection and storage bins. These additional bins will need to be strategically located to ensure that they are convenient to as many waste generators as possible, as well as be in compliance with all applicable fire laws. In addition, the bins must be regularly serviced (i.e. emptied and cleaned). This servicing will require additional expenditures in labor and collection equipment. Furthermore, an aggressive educational campaign designed to maximize awareness and participation is critical to achieving the 13.3 percent diversion goal associated with this alternative. All of these issues can be effectively addressed; however, without a commitment by UCD to provide additional funding to ASUCD, Physical Plant, and possibly other campus groups involved, this alternative cannot be effectively implemented.

Consistency with Local Policies and Plans

The actions associated with this alternative do not appear to present any conflicts with UCD policies. One issue that may present some difficulty is locating storage bins outside of buildings. In some cases, there may not be a suitable site for a storage container, or the container will take away from the building's aesthetic appeal.

Institutional Barriers to Implementation

No istitutional barriers exist.

Need for Facilities, Equipment and Labor, and the Associated Costs

Costs for implementing this alternative will depend upon the actual number of new bins purchased, collection needs, and the allocation of administrative responsibilities among the various departments and groups involved. However, assuming that collection bins are conveniently placed in most campus buildings at a ratio of approximately 1 set of 3 bins per 10,000 square feet (to ensure a satisfactory level of convenience, while not inundating the campus with bins), and taking into consideration that there are already 400 bins situated on campus, then approximately 1,800 new collection bins will be needed. These bins will be of a variety of shapes and sizes to accommodate various siting needs, however the average bin cost is estimated to be $46.00. Bins would most likely be phased in groups of several hundred at a time over a two or three year timeframe.

Additional large storage bins will be needed outside of many buildings to receive and store the recyclables collected in the smaller, indoor collection bins and transported by ASUCD or the custodial staff.

Summarized in Table 5-2 below are estimates of the quantities and types of outside storage bins that will be needed.

TABLE 5-2 Estimated Number of Outside Storage Containers for Alternative #2

Storage Bin Size	Needed Number	Current Number	Number to be Purchased	Unit Price	Total
6 yard	40	23	17	$1,075	$18,275
4 yard	2	2	0	$650	$ 0
2 yard	40	20	20	$550	$11,000
90 gal.	170	125	45	$ 70	$ 3,150
Total	--	--	--	--	**$32,425**

ASUCD will most likely continue to provide support to many recycling efforts through its Project Recycle. ASUCD's services will include collection services to some programs as well as campus-wide educational programs and materials. The present ASUCD operating budget for these services is $25,463 per year. Should ASUCD assume responsibility for a greater number of collection bins, its operating budget will need to increase.

Physical Plant will most likely provide the majority of the outside storage bin collection services. However, ASUCD could also provide some or all of this service, if provided with sufficient funding to satisfy the associated staffing and equipment needs. In either case, once all of the new collection and storage bins are installed, a total of 4.5 full time or part time collectors are estimated to be necessary. In addition, vehicle equipment needs are expected to increase and include one to two dedicated front-end loaders, two flatbed trucks, and two pickup trucks. In total, labor associated with moving material in the collection bins and outside storage bins is expected to cost $365,000 per year (in 1991 dollars, once program is fully implemented). In addition, due to the significant increase in the amount of material that will be handled, a larger centralized storage and processing facility will most likely be needed. A price estimate has been obtained by Physical Plant staff to build such a facility at the Waste Water Treatment Facility. Total cost is estimated to be $21,300.

Shown below are the estimated capital and operating costs associated with implementation of this alternative. For purposes of this cost estimate, it has been assumed that either ASUCD, Physical Plant, or another UCD department will have responsibility for the collection of all outside storage containers and the servicing of all new collection containers.

Estimated Capital Costs:

Storage Facility	$21,300
Investment in new collection bins	$65,000
Investment in new outside storage bins	$32,425
Total Investment	$118,725

Estimated Operating Costs:

Administrative	$30,000/year
Labor	$365,000/year
Equipment	$45,000/year
Total annual operating costs	$440,000/year

If the capital costs are amortized over a five year period and added to the annual operating costs, the total annual cost of this alternative is $470,000. Assuming a diversion rate of 13.3% is achieved, this alternative will divert approximately 2,377 tons of material per year. This translates into a cost of $198 per diverted ton per year.

Market Availability

This alternative involves programs that collect various paper products, glass, aluminum, and some plastics. Currently, markets exist for all of these material types.

Public Acceptance

In general, people want to recycle. Consequently, this alternative is expected to receive wide spread public acceptance and participation, particularly since it will establish a uniform set of guidelines that should simplify participation.

Alternative #3

Establish a Mixed Waste Material Recovery Facility.

This alternative involves building a mixed waste material recovery facility (MRF) at which recyclable materials are removed from the delivered waste stream. The facility would most likely be constructed at the landfill and be sized to handle approximately 60 tons per day. The entire waste stream would be tipped on a tipping floor and then be manually or automatically sorted to remove the targeted recyclable materials. The remaining material would be reloaded into a transfer vehicle and moved to the active face of the landfill for disposal. This type of operation would reduce the amount of source separation needed, as well as the separate collection routes and associated educational efforts traditionally involved with recycling programs. In turn, the responsibility for ensuring that recyclable materials do not enter the landfill would be placed upon the MRF operator. This alternative does, however, assume that the facility would be operated in conjunction with the existing recycling programs remaining intact (since some sort of source separation program should be offered to those that want to recycle), but will eliminates the need for the more aggressive source separation measures described in Alternatives 1 and 2.

Effectiveness

It is estimated that the MRF operation could remove 50 percent of the targeted recyclable materials in the disposed waste stream. This would most likely include paper products, glass, aluminum cans, ferrous metals, and plastics (see Table 3-1 for quantities). This recovery effort would result in approximately 2,450 tons per year of recyclable material. This, plus the 520 tons of recyclables collected per year through the existing source separation programs, would result in a total diversion of 2,970 tons per year, or close to a 16.6 percent diversion rate.

Consequences on Waste Stream

This alternative involves programs which will remove paper products, glass, aluminum cans, and some other recyclable materials from the waste stream that is headed for landfill disposal. Removal of these material types has no significant impact on the remaining disposed waste stream in terms of how it is landfilled or how it acts over time once buried in the landfill.

Ability to be Implemented
Many manufacturers claim to be able to supply mixed waste material recovery systems. Several such systems are in place and operational around the country. Operating performance date on these facilities provides mixed results. In some situations, claims of success are being made. In other cases, systems have failed to perform effectively.

Need for facilities
The alternative will require the siting, permitting, and construction of a 60 ton per day mixed waste MRF. Most likely, such a facility would be located at the landfill, due to the landfill's close proximity to the waste generating sources and the availability of land.

Consistency with local policies and plans
The type of facility poses no known problems with Federal, State, County or University policies or plans.

Institutional barriers to implementation
No institutional barriers are known to exist.

Cost
As mentioned, the existing source separation recycling programs would continue to operate under this alternative. Costs for this existing activity are detailed in Alternative #1, and result in a cost per diverted ton of approximately $217.

In addition, a MRF would be designed, permitted, constructed and operated. A MRF can be a very large capital investment. Exact costs depend upon the level of sophistication and automation employed. Consequently, an exact cost figure cannot be quoted. However, a price range of $350,000 to $1.5 million is realistic, given the need for a 60 ton per day facility. For evaluation purposes, a labor intensive facility design will be assumed, and a capital cost estimate of $500,000 will be utilized. Amortizing this capital investment over five years (to be consistent with Alternatives 2 and 3) works out to be an annual cost of approximately $100,000. Operation of this type of facility will most likely involve five (5) to eight (8) full-time employees. For cost estimating purposes, a total of seven (7) full-time employees is assumed, at a rate of $40,000 per year per employee. This works out to an annual labor cost of $280,000 per year. Facility maintenance and utility costs are estimated at $50,000 per year.

Summarized below are the annualized costs of the MRF and total costs for this alternative:

Amortized Capital Investment	$100,000
Labor	$280,000
Facility Operation and Maintenance	$50,000
Administrative Costs	$25,000
Annual Costs of MRF	$455,000
Annual Costs of Existing Programs	$112,500
Total Annual Costs of Alternative #3	$567,500

Assuming this alternative recovers in total 2,970 tons of recyclables per year, then this alternative results in an annual cost per diverted ton of $191.

Market Availability

This alternative involves efforts that would collect various paper products, glass, aluminum, and some plastics. Currently, markets exist for all of these material types. It should be noted that this type of recovery operation may result in higher levels of contamination, thus reducing the marketability of some materials.

5.5 SELECTION OF RECYCLING PROGRAM ALTERNATIVES

Based upon the evaluation of the four recycling program alternatives presented in Section 5.4, UCD has selected **Alternative #2 ("Creation of Centrally Managed, Campus-Wide Recycling Program")** for implementation.

5.5.1 Description of Selected Recycling Program (Alternative #2)

Presently, ASUCD Project Recycle and Physical Plant perform the majority of the recycling collection services that occur on campus. ASUCD in particular has developed a campus-wide source separated bin collection program for office paper, aluminum and glass. As described in Section 5.2, several other departments also have some recycling efforts going on within their offices or buildings, but most of these efforts are provided with collection support from ASUCD and/or Physical Plant staff. This alternative would involve expanding the existing programs campus-wide by adding collection bins and material types to improve participation and increase the quantities of materials collected. In addition, improved educational efforts to accompany the various collection efforts would be developed to increase awareness of the recycling programs and provide an understanding of how the programs work. In particular, areas of the campus currently not receiving recycling service would be identified and targeted for new programs.

To facilitate this alternative, one centralized coordination entity will assume responsibility for the coordination of all recycling programs occurring on campus. This entity will be charged

with the task of aggressively seeking methods that will improve the efficiency of the existing programs, as well as develop new programs for areas of the campus that are currently not recycling. This alternative provides for a designated person, organization, or UCD department with overall coordination responsibility for all recycling occurring on campus and to ensure consistency between departmental programs, compliance with fire laws, and fulfillment of reporting requirements to Yolo County and the California Integrated Waste Management Board (CIWMB). As such, this centralized entity will be involved with all equipment, staffing, operations, and capital investment recommendations associated with recycling programs. Most likely there will be other UCD departments, organizations, and associations providing recycling services under the general guidelines and performance specifications established by the central coordinating entity.

In those areas where recycling is already occurring, a review of the existing operating procedures and overall program effectiveness will be conducted to determine how diversion rates can be improved. Problems will be determined, solutions formulated, new equipment or facilities installed and/or procedures implemented (if necessary), and educational programs developed. Responsibility for implementing this alternative would most likely be shared by ASUCD, Physical Plant and some of the other UCD departments and organizations involved with recycling. These new initiatives would be done as the time of available staff and existing budgets permit.

Specific aspects of this program may include:

1) Providing recycling bins to areas of campus currently not serviced;

2) Providing additional recycling bins to selected areas of campus which currently have some service, but could use more;

3) Ensuring that a designated entity is responsible for regularly moving recycled material from recycling bins to the larger collection bins (custodial staff, volunteer, other UCD employee);

4) Developing a system to closely examine each existing recycling program and determine how to improve effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

5) Developing tailored educational programs for each recycling effort to increase effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

6) Coordinating the installation of new facilities, equipment and/or operational procedures in the Coffee House, residence halls, kitchens, administrative offices and other areas where larger scale recycling operations are in place that will

improve program effectiveness. This could include items such as individual office mixed paper collection bins, chutes in residence halls for recyclable material, dedicated tools for sizing cardboard in areas where cardboard is generated and recycled, etc.

7) Increasing collection frequency by ASUCD and Physical Plant staff for recycling bins they service to ensure that bins always have available space and are clean.

5.5.2 Reasons for Selecting Recycling Program Alternatives

Alternative #2 (**"Creation of centrally managed, campus-wide recycling program"**) has been selected for the following reasons:

1) It will increase the current recycling diversion rate from 2.9 percent to 13.3 percent once fully implemented.

2) It will minimize operating costs through programs relying on source separation techniques.

3) It will ensure maximum operation efficiency and coordination between variety of groups involved (ASUCD, Physical Plant, Student Housing, etc.) by having one entity managing the entire program.

4) It will ensure that the necessary diversion reporting will be done consistently for all recycling programs (i.e. Student Housing, Memorial Union, Administrative Offices and Classrooms, Outdoor Campus Collection, etc.).

5) It will minimize confusion on source separation and preparation needs and increase routine participation.

5.5.3 Diversion Anticipated From Selected Recycling Program Alternatives

As mentioned above, the diversion rate anticipated once Alternative #2 is fully implemented is 13.3 percent of the total waste generated by UCD.

Shown in column 1 of Table 5-4 are the material types that the selected program will target for diversion from the waste stream through the campus wide source separation programs. Column 2 shows the amount of material currently being diverted by the existing source separation programs. These existing efforts are expected to continue and will be incorporated into the expanded program which Alternative #2 offers. Column 3 shows the amounts of the targeted materials that are currently being disposed of in the UCD landfill. Column 4 shows the expected recovery rate from the current disposed waste stream for each material type that will ultimately be achieved once Alternative #2 is fully implemented. Column 5 shows the additional amount of material that will be collected once Alternative 3 is fully implemented (in addition to

the current material being diverted). Column 6 is the sum of columns 2 and 5 and represents the total diversion anticipated for each of the targeted material types. It is important to note that 1991 annual tonnage figures are utilized in Table 5-4. With time, the amount of material in the disposed waste stream may increase (see Section 3.5). However, the recovery rate is expected to remain constant, and as a result, the total diversion for this Alternative is expected to be approximately 13.3 percent when fully implemented.

Table 5-4. Targeted Materials, Projected Recovery Rates, and Overall Diversion Rate

Targeted Material Type	Amount Currently Recycled	Amount Currently disposed	Projected Recovery Rate	Additional Amount Recycled	Total Amount Recycled
Aluminum Cans	2	17	75%	13	15
Cardboard	142	777	75%	583	725
Glass	186	150	75%	113	299
High Grade Paper	86	621	75%	466	552
Mixed Paper	21	497	75%	373	394
Newsprint	83	289	75%	217	300
PET Plastic	0	7	75%	5	5
HDPE Plastic	0	25	75%	19	19
Bi-metal/ tin cans	0	90	75%	68	158
Totals	520	2,473	75%	1,857	2,377

The 2,377 tons of material diverted by this alternative represents 13.3 percent of the total waste generated at UCD. As described in Section 5.6, the selected program (Alternative #2) will be phased in slowly over a five-year time frame beginning in 1996.

Shown below in Table 5-6 are the expected diversion rates that should be occurring at the completion of the short-term (1995) and medium-term (2000) time periods.

Table 5-6. Anticipated Diversion Rates for Short-Term and Medium-Term Time Periods

Selected Recycling Program Alternative	Short-Term Diversion Rate (1995)	Medium-Term Diversion Rate (2000)
Alternative #2	2.9%	13.3%

5.5.4 Markets for Materials Diverted By Selected Recycling Program Alternatives

Presented below in Table 5-7 are the end use markets anticipated for the material that will be collected through implementation of the selected recycling program alternative.

Table 5-7 Markets for Materials Diverted by Selected Recycling Program Alternatives

Targeted Material Type	Market/End Use
Aluminum Cans	To Be Determined
Cardboard	To Be Determined
Glass	To Be Determined
High Grade Paper	To Be Determined
Mixed Paper	To Be Determined
Newsprint	To Be Determined
PET Plastic	To Be Determined
HDPE Plastic	To Be Determined
Bi-metal/tin cans	To Be Determined

5.5.5 Handling Methods for Selected Recycling Program Alternatives

As described in Section 5.5.1, the selected recycling program alternative (Alternative #2) will involve a campus-wide source separation program with collection bins being conveniently located in student housing, administrative offices, classrooms, kitchens, the Memorial Union building, and other locations campus-wide. Bins will most likely be identified for different material types to minimize any sorting that may be necessary, thus making the collected material more marketable. Separate bins will be provided for different grades of paper products in some cases, in other situations, one bin may be used for all types of paper. Aluminum, glass, plastic containers, and bi-metal cans will probably be commingled together. The exact configuration of the bins and their locations will be determined through a detailed analysis of the campus, taking into consideration the types of materials generated, fire safety regulations, and the number of people in each location (see Task discussed in Section 5.6.1). The smaller collection bins will be regularly emptied by custodial staff or ASUCD student labor into larger storage containers that will be situated to allow for collection vehicles to access them easily. Once the material is collected in the collection vehicles, it will be taken to one of several potential destinations, depending upon material type and market conditions. Summarized below in Table 5-8 are the expected destinations for the collected materials.

Table 5-8 Destination of Collected Recyclable Materials

Material Type	Destination Once Collected from Outside Storage Containers
Computer Paper	Sacramento Area Brokers
High Grade Paper	Davis Waste Removal Services
Mixed Paper	Davis Waste Removal Services
Newsprint	Davis Waste Removal Services
Glass Containers	Davis Waste Removal Services
Aluminum Containers	Davis Waste Removal Services
Plastic Containers	Davis Waste Removal Services
Bi-metal/tin cans	Davis Waste Removal Services

5.5.6 Facilities Necessary for Selected Recycling Program Alternatives

As described in Section 5.5.5, the selected recycling program alternative (Alternative #2) will involve a campus-wide source separation program with collection bins being conveniently located in residence halls, administrative offices, classrooms, kitchens, the Memorial Union building, and other locations campus-wide. The material collected will be regularly moved by custodial staff or ASUCD student labor from the smaller collection bins located inside buildings (and in some cases outside in well-traveled areas) to larger outdoor storage containers (some may be located indoors). In most cases, it is expected that these larger outdoor storage containers will be easily situated without the need for any additional facilities (i.e. a structural enclosure). For some material types (computer paper & confidential paper), the material is brought to the Waste Water Treatment Facility for stockpiling until sufficient amounts are collected. This may require a larger storage area than is currently available (refer to Table 5-8 for a listing of these material types). Most likely, a dry, covered area that has convenient truck access will be needed. Additional study will be necessary to determine the exact size design requirements for this facility.

5.6 IMPLEMENTATION OF RECYCLING PROGRAM ALTERNATIVES

The selected recycling program (Alternative #2 - **"Creation of Centrally Managed, Campus-Wide Recycling Program"**) will be implemented gradually over a five year timeframe beginning in 1996. In the interim, the existing programs will continue to operate in their current form. The additional collection bins associated with Alternative #2 will probably be purchased in groups of 300 to 400 at a time, each year, over a five year time period. Bin placement will be done in such a way that the initial efforts will target the higher valued and most prevalent material types (high grade paper, cardboard) that are generated in the more densely populated areas of the campus. Subsequent bin purchases will be positioned in locations to collect the materials that are less prevalent in the waste stream and in the more remote areas of the campus.

The larger outside storage bins needed to support the collection process will also be purchased in phases as needed to coincide with the smaller collection bin purchases.

Labor needed to operate the program will be increased gradually as well, and be done in accordance with the collection needs associated with the number of new bins added each year, and the amount of material being collected.

5.6.1 Implementation Plan

Summarized below in Table 5-9 is a detailed summary of the implementation tasks associated with Alternative #2.

Table 5-9 Implementation Plan for Selected Recycling Alternative #2

Task	Task Description	Responsible Entity	Start Date*	Completion Date*
1	Perform detailed analysis of campus buildings, traffic patterns, and population densities to determine exact locations for collection bin placement, bin size, and material types to be collected to achieve campus-wide coverage. Analysis should consider a purchasing and placement approach that involves 5 phases that will occur over a 5 year time period.	To be determined	1/95	5/95
2	Perform detailed analysis of larger-outside storage bins needed to support the smaller collection bins. Determine exact locations, bin sizes, and material types to be collected. Analysis should consider a purchasing and placement approach that involves 5 phases that will occur over a 5 year time period.	To be determined	3/95	7/95
3	Perform detailed analysis of labor and management options available to operate the campus-wide recycling program (Alternative #3). Determine the most cost effective approach to managing and operating program which will achieve the diversion goal for the recycling program of 13.3 percent by the year 2000. Analysis should consider an approach that involves 5 phases that will occur over a 5 year time period.	To be determined	3/95	8/95
4	Perform detailed analysis of the outside collection bin process to determine the combination of collection vehicles that will be necessary to support the campus-wide recycling program. Secure trucks from Fleet Services. Develop routes to effectively and efficiently collect material. Analysis should consider an approach that involves 5 phases that will occur over a 5 year time period.	To be determined	6/95	10/95
5	Develop monitoring and evaluation methods. Develop standardized report formats for tracking materials collected, sources, and amounts.	To be determined	9/95	12/95
6	Phase 1 - Purchase, locate, and begin collection of the new collection bins.	To be determined	1/96	12/96
7	Evaluate results of Phase 1 and adjust plans for Phase 2 implementation as necessary.	To be determined	9/96	12/96
8	Phase 2 - Purchase, locate, and begin collection of the new collection bins.	To be determined	1/97	12/97
9	Evaluate results of Phase 2 and adjust plans for Phase 3 implementation as necessary.	To be determined	9/97	12/97
10	Phase 3 - Purchase, locate, and begin collection of the new collection bins.	To be determined	1/98	12/98
11	evaluate results of Phase 3 and adjust plans for Phase 4 implementation as necessary.	To be determined	9/98	12/98
12	Phase 4 - Purchase, locate, and begin collection of the new collection bins.	To be determined	1/99	12/99
13	Evaluate results of Phase 4 and adjust plans for Phase 5 implementation as necessary	To be determined	9/99	12/99
14	Phase 5 - Purchase, locate, and begin collection of the new collection bins.	To be determined	1/2000	12/2000
15	Ongoing monitoring, evaluation and reporting.	To be determined	1/92	Ongoing

* NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.

5.6.2 Implementation Costs and Funding Sources

Implementation of the selected recycling program (Alternative #2) will involve investment in equipment and new operating costs. Estimates for these expenditures are as summarized below in Table 5-10, along with the anticipated source of funds that will be used to pay for these expenditures. It is important to note that costs shown in 1991 dollars and represent full implementation of the program (that will not occur until the year 2000). As described in Section 5.6.1, the program will actually be phased in over a five year period. Consequently, the total investment in new bins shown in Table 5-10 will be spread evenly over the five year implementation time frame. Operating expenditures will also increase gradually over this time frame.

Table 5-10. Estimated Implementation Costs of Selected Recycling Program Alternative and Funding Sources

Expenditure Type	Annual Estimated Costs	Funding Source
Collection bins	$64,500 (total investment)	To be Explored in Medium-Term
Outside Storage bins (total investment)	$32,500 (total investment)	To be Explored in Medium-Term
Labor	$365,000 (once fully implemented)	To be Explored in Medium-Term
Leased equipment	$45,000 (once fully implemented)	To be Explored in Medium-Term

5.7 MONITORING AND EVALUATION OF SELECTED RECYCLING PROGRAMS

5.7.1 Methods to Quantify and Monitor Achievement of Objectives

In the short-term planning period, each UCD department or campus group that conducts a recycling program will be asked to prepare regular reports that provide either actual or estimated tonnage figures for the amount of material being diverted as a result of their program (by individual material type). The report shall be prepared annually, at a minimum. In some cases, scales may be used if available, in other cases where actual measurements are not possible, reasonable estimates shall be made based upon a set of clearly stated assumptions. In the medium-term planning period, once the recycling programs are consolidated under one management entity, the designated entity will be responsible for producing these reports.

5.2.7 Written Criteria for Evaluating the Program Effectiveness

In addition to providing quantitative information concerning a program's effectiveness, other criteria shall also be considered in an annual evaluation of each program's overall performance. This evaluation shall include a stated set of criteria, which may include answers to questions such as:

- Are stated diversion objectives being met?
- Was the program implemented on schedule?
- Do people understand the recycling programs and are they participating to the fullest extent possible?

These criteria shall be developed by the UCD department charged with the responsibility of overseeing the University's implementation of the programs defined in this SRRE (which will presumably be the designated entity referred to in Section 5.7.1).

5.7.3 Agencies, Organizations, Persons Responsible for Monitoring, Evaluation and Reporting

Listed below in Table 5-11 are the entities responsible for performing the monitoring, evaluation and reporting for each of the existing recycling programs in the short-term planning periods.

Table 5-11 Entities Responsible for Monitoring, Evaluation, and Reporting

Recycling Programs	Responsible Entity
Project Recycle	ASUCD (Mark Champagne)
Student Housing Residence Hall	Housing Staff
Student Family Housing	Physical Plant (Bobbie Koehler)
Mixed Paper Collection	Physical Plant (Bobbie Koehler)
ReproGraphics Recycling Program	ReproGraphics
VMTH Recycling Program	VMTH
Recreation Hall Recycling Program	A.C. Hannam
Central Stores/Receiving Purchasing Program	Central Stores/Receiving
Project TREE	Telecommunications

5.7.4 Monitoring and Evaluation Funding Requirements

It is expected that the additional costs associated with monitoring and evaluating the performance of the recycling programs by the various responsible entities will be minimal and will be incorporated into the total operational costs of the department.

5.7.5 Measures to be Implemented if there is a Shortfall in the Diversion Objectives

Should the selected recycling programs fall short of the stated diversion rate objectives (as presented in Table 5-4), UCD may consider the development and implementation of regulatory programs and controls, including certain product bans, material type bans, mandatory recycling and reporting by UCD departments, and procurement requirements.

SECTION 6

COMPOSTING COMPONENT

Composting is the biological degradation of organic materials under controlled conditions. Although composting is only one component of integrated waste management at U.C. Davis, it can be a major contributor towards the achievement of the AB 939 goals of 25 percent reduction of waste entering the landfill by 1995 and 50 percent reduction by 2000. Due to the large amount of organic material in the waste stream, composting has the potential to become a primary method of managing solid waste.

The typical composting program starts with a collection system and ends with the sale or delivery of a useful soil amendment. The general development and implementation strategy for success of a composting program follows:

1. Determine what materials will be composted
2. Determine the volume and weight of material to be composted
3. Determine collection strategy
4. Evaluate different composting methods
5. Choose a composting facility site
6. Assess equipment needs
7. Determine one or more end-users for compost
8. Secure regulatory approvals and permits
9. Educate residents about the program
10. Develop a method for monitoring the composting operation
11. Develop a system for tracking costs and revenues

Overall goals in selecting a composting program for U.C. Davis include the following:

- Maximize the use of existing facilities
- Provide for flexibility in system design
- Minimize long-term capital investments
- Coordinate with other county composting programs
- Seek maximum level of waste diversion
- Maintain records of diversion levels and program costs

This component will address various alternatives associated with composting, including collection and siting, as well as specific composting process technologies. The University has chosen the alternatives that are applicable to its needs. These alternatives will be covered in more detail as the preferred alternatives.

A variety of materials in the waste stream can be composted. Yard waste is easily separated and composted by itself or co-composted with sewage sludge. Food is also readily compostable, but is harder to separate from the waste stream. Food waste separation is not commonly practiced in the United States and may require local ordinances to ensure that separation occurs.

Several facilities in the United States are composting the total organic portion of the waste stream including paper, yard waste, food, manure, and even disposable diapers. This type of composting is referred to as municipal solid waste (MSW) composting or as mixed municipal solid waste (MMSW) composting. This technology has been used extensively in Europe, but is still in the development stage in the United States. Markets for MSW compost are severely limited by contaminants.

MSW can also be co-composted with sewage sludge. This would restrict the market for the finished compost product because heavy metals can concentrate in the final composting product. The EPA will release regulations in 1992 for the use of sewage sludge composting products. It may be in the best interest of the University to avoid the use of sewage sludge until these regulations are released.

Composting provides a stable, decomposed material suitable as a soil amendment that improves the moisture retention capacity of soil, adds nutrients and provides erosion control. Since UC Davis generates 6306 Tons per year of grass, leaves, wood, ag crop residue and manure - about 28 percent of the annual waste generation - composting can help meet AB 939 goals by diverting a substantial volume of yard wastes and other organic materials from the landfill.

Campus yard waste, wood waste and manure are ideal materials for composting because of their ease of separation and collection at the source. More wood waste than grass, leaves and prunings combined is generated on campus, but it takes several years to decompose, making it more appropriate for chipping and recycling as mulch, soil amendment and animal bedding.

Wood wastes used as boiler fuel are regarded as "transformation" and do not count in the short-term planning period towards the University's diversion goals. After 1995 transformation can provide a maximum diversion credit of 10 percent toward the 50 percent requirement.

Yard wastes and manure are easily source separated prior to collection. This collection method produces relatively contaminant-free materials which minimize the processing costs and produce a high quality end product that is more easily marketed. Yard wastes collected by the Grounds department can be delivered directly to the site or collected and delivered with a dedicated front loader collection route. The campus landfill permit status precludes composting yard wastes for the short-term. Yard wastes can, however, be chipped and recycled as mulch and soil amendment. The University is addressing this in the permit renewal process.

Manure is easily collected at the source. The Animal Science department delivers manure directly to the landfill. Other manure and bedding could be collected and delivered with a

dedicated front loader collection route in the short-term. An additional source of manure and bedding could be composted in the medium-term once contamination problems are eliminated.

A variety of processing alternatives are available, including windrows, aerated static piles, and in-vessel systems. Windrows and aerated piles are the least expensive methods, require more land, and take longer to produce a finished product, in-vessel systems require more capital for equipment, but process material faster and require less acreage.

6.1 GOALS AND OBJECTIVES

Based on the Waste Generation Study the following objectives for the short-term (present to 1995) and medium-term (1996 to 2000) planning periods have been established. The current and projected levels are shown, by material type, in Table 6-1.

Short-Term Objectives

The Short-term objectives of the composting program will be to:

- Continue the existing manure composting program.

Medium-Term Objectives

The medium-term objectives of the composting program will be to:

- Increase the total capture rate of animal manures generated at the University of California Davis, thereby contributing to diversion through manure composting 28.2 percent of total waste generated.
- Refine the animal manure collection system.
- Further educate the campus community about the composting program.
- Require campus departments to give preferential consideration to the use of compost and chipped wood waste in maintenance of campus lands.
- Identify additional potential end-users and their anticipated product quality and quantity requirements.
- Raise the total capture of yard waste, and wood waste residue at the University of California Davis, thereby increasing total diversion through composting and chipping to 31.7 percent of total waste generated.
- Evaluate the feasibility of co-composting with other organic waste fractions as well as sewage sludge.

TABLE 6-1. WASTES TARGETED FOR COMPOSTING

Material	Current Generation		Current Diversion		Current Disposal	
	[1]Tons	[2]Percent	[1]Tons	[2]Percent	[1]Tons	[2]Percent
Grass, leaves	118	0.7	0	0	118	0.7
Prunings	223	1.3	47	.3	176	1.0
Manure	5,046	28.2	2,940	16.5	210	11.8
Wood, Brush, Straw	904	5.1	561[3]	3.1	343	1.9
Total	6,291	35.3	3,548	19.8	2,743	15.4

1. Yolo County Waste Generation Study, EBA Wastechnologies, July 1991
2. Percent of total generation MSW 17,922 Tons per year
3. Transformation

6.2 EXISTING CONDITIONS

General Descriptions of Composting Programs

The UC Davis Physical Plant currently diverts and composts 2940 tons per year of manure delivered directly to the composting site at the campus landfill located north of Putah Creek and west of County Road 98. The site is currently permitted to compost animal manures only. The five year review of the 1978 CIWMB Facilities permit is in progress. No additional materials may be composted at this time. The Animal Science department is the major contributor.

The Student Farms, under direction of the Agronomy Department, operate a food waste composting operation at Student Farms headquarters located on Extension Center Drive.

The Department of Civil Engineering operates an anaerobic in-vessel system located at the Hydraulics laboratory on Campbell Road in Campbell Tract.

Both of the above are demonstration projects and have no substantial effect on the waste stream.

Manure Composting

The manure composting facility is located at the landfill. A Caterpillar D8 dozer spreads the material for drying and turns the material three times per week to control fly production. Finished material is pushed to a pile at the south end of the area for removal. The public and campus community are encouraged to remove as much of the material as they wish, free of charge.

A total of 2940 TPY of manure is processed at the site. Material is delivered by dump trucks which are weighed on arrival.

Wood and Brush

Wood and Brush is being placed in separate area of the landfill. A total of 660 tons per year will be chipped and used for mulch at the University. This is composed of 50 percent of the currently diverted wood waste, 25 percent of the currently disposed wood waste and 100 percent of the currently disposed grass, leaves and prunings.

6.3 EVALUATION OF COMPOSTING ALTERNATIVES

DESCRIPTION OF ALTERNATIVES

The University has a very successful manure composting program in place. A number of alternatives are available to enhance the existing program. These alternatives may be broadly classified into three categories - collection, processing and siting. Presented below is a list of the alternatives considered within this section, followed by an evaluation of each alternative.

Collection Alternatives

Alternative 1. Expand Source Separated Collection.
Alternative 2. Mandate Delivery of Source Separated Material.

Process Alternatives

Alternative 1. Continue and Expand Manure Composting.
Alternative 2. Change to Yard Waste and Manure Composting Process.
Alternative 3. Change to Anaerobic Composting.
Alternative 4. Add MSW Composting.
Alternative 5. Wood and Green Waste Chipping

Siting Alternatives

Alternative 1. Continue to Use Existing Site at Landfill.
Alternative 2. Change to new Campus Site.
Alternative 3. Change to Centralized Regional Site.

Collection Alternatives

Collection Alternative 1. Expand Existing Source Separated Collection

Manure currently composted is delivered to the site by Animal Science department workers. In this collection alternative, Physical Plant solid waste crews now collecting waste for burial would dedicate one route to collecting manure, bedding straw and yard waste. Which materials would be diverted in the short- and medium-term planning periods would depend on compost processing alternatives selected.

Effectiveness
Collecting all manure now buried and diverting it for composting increases the potential for composting by 2,106 tons/year. If this material is diverted, an increase of 11.8 percent of the diversion rate would be realized.

Hazards
Existing hazards include fires caused by materials landing on vehicle exhaust manifolds, and materials blowing during bin dumping on windy days.

Ability to Accommodate Change
Any change in quantity and/or quality of source separated wastes can be accommodated by changing collection patterns and frequency, and/or increased educational activities.

Consequences on Waste Stream Composition
Waste intended for burial would be reduced by the amount that is redirected for composting.

Ability to Be Implemented
Source separated collection could be implemented by modifying collection routes and changing some operational procedures at the landfill.

Need For Facilities
No additional facilities or equipment is needed. The material is being collected for disposal now.

Consistency with Applicable Local Policies, Plans, and Ordinances
Physical Plant worker collection of source separated manure for composting is consistent with local policies, plans and ordinances. Physical Plant solid waste workers currently collect non-hazardous solid waste for disposal in the landfill and for diversion through recycling and salvage.

Institutional Barriers to Implementation
No institutional barriers to implementation exist.

Cost
One Full Time Employee (F.T.E.) is needed to collect non-contaminated manure from the various animal locations, maintain the vehicle and storage bins, and keep records for an annual cost, plus benefits of $41,000. One front loader collection vehicle costs about $23,000 annually for mileage and base rate. Thus annual collection costs total about $64,000. These costs are incurred by the current solid waste budget because the material is being collected and buried in the landfill. Thus no additional cost would be incurred.

Market Availability
The compost would be offered free of charge, or sold at a minimal charge if possible, to the public or used internally by the University.

Technical Reliability/Public Acceptance
Collection equipment generally is reliable. Back up equipment exists within the solid waste front loader fleet. The generators likely would welcome having the material picked up at the

generation site. Some resistance to changing disposal habits to ensure that only manure, ag crop residue and/or clean yard waste is placed in collection bins may exist. This can be reduced through educational efforts.

Collection Alternative 2. Mandate Delivery of Source Separated Material

Instead of Physical Plant solid waste crews collecting source separated manure, bedding straw and yard waste, each generating department would be expected to deliver its own materials to the composting site. The Animal Science department delivers 2,940 tons of manure annually in this manner.

Effectiveness

The potential for diversion is the same as described in Collection Alternative 1. Actual short-term and medium-term effectiveness in reducing materials buried would be less. Budgetary restrictions impact staffing and the number and types of vehicles available for lease from Central Garage.

Hazards

Hazards can include back injuries from increased manual handling of waste, material blowing in the wind, increased traffic on County Road 98, and increased staff needs at the composting site to process the additional smaller deliveries.

Ability to Accommodate Change

Mandatory delivery of source separated waste may be changed easily to provide for alternative collection methods. Changes in the program would be accompanied by generator education.

Consequences on Waste Stream Composition

Organic waste intended for burial would be reduced by the amount that is redirected for composting.

Ability to Be Implemented

Mandatory delivery of source-separated wastes can be implemented by changing and enforcing campus refuse collection policies and procedures.

Need For Facilities

No additional space is needed.

Consistency with Applicable Local Policies, Plans, and Ordinances
Campus policy allows campus departments and activities to deliver acceptable solid waste to the campus landfill during posted operation hours. The composting site is located within the landfill boundaries.

Institutional Barriers to Implementation
Other than funding restraints, no institutional barriers to implementation exist.

Cost
The 18 or so departments generating ag crop residue, manure or yard waste would need funding to support vehicle rental and mileage, and at least 30 minutes of staff time per delivery. The Physical Plant solid waste budget would realize savings by shifting collection responsibility to individual departments. The cost of one employee ($41,000) and one truck ($23,000/yr) would be eliminated from the solid waste budget.

Technical Reliability/Public Acceptance
For reasons previously identified, acceptance of mandatory departmental delivery of source-separated bedding straw, yard waste and manure generated by operations other than Animal Science can be expected to be low.

6.3.2 Composting Process Alternatives

Process Alternative 1. Continue and Expand Existing Manure Composting Process

Manure from the animal science department is spread in six inch layers and turned or stirred three times per week or more often if needed to reduce spontaneous combustion dangers and to control fly breeding. When dry and "cool", the finished product is pushed into the pile and given without charge to the public and campus community members who wish to take it on a load your own basis. Two days per week solid waste workers assist with loading using a front loader.

Effectiveness
Approximately 16.5 percent of the waste stream is diverted from burial by the present composting program. Additional diversion of manure (up to 28.2 percent of the waste stream) is possible with the selection of one of the alternative collection methods described above. However, due to the limited processing equipment, only manure, such as that available at the Equestrian Center or Avian Sciences could be added. In order to accommodate any additional manure a compost turner would need to be acquired.

Hazards
Hazards include fire, vector production and attraction, odors, run-off and blowing materials.

Ability to Accommodate Change
Because the current process is operated by Physical Plant solid waste workers operating the campus landfill, any reduction in weight or volume is easily accommodated. The program may be easily upgraded to employ modern equipment to process other materials and to produce more uniform end products.

Consequences on Waste Stream Composition
If additional manure is processed, it would decrease the amount of waste buried.

Ability to Be Implemented
The existing program has been in operation for some time. The expansion plan described by this alternative can be implemented provided space and funding are provided.

Need For Facilities
No additional space is needed to continue the existing program. However, additional space will be necessary to accommodate the expansion. The additional space necessary is available at the landfill.

Consistency with Applicable Local Policies, Plans, and Ordinances
There are no conflicting policies, plans or ordinances that would affect continuing the present operation.

Institutional Barriers to Implementation
No institutional barriers exist with the current operation.

Costs
Current annual costs to spread and load the manure are $25,067.

If the program were expanded it is anticipated that annual costs would increase to $53,000. This is based on the need for a full time employee at $41,500/yr. and the continued lease on a spreader from UCD services at $11,500/yr.

An additional capital cost of from $50,000 to $60,000 for a compost turner would be incurred when the additional manure is added beyond that which would come from the Equestrian Center and Animal Sciences.

Market Availability
The compost is given free of charge to the public.

Technical Reliability/Public Acceptance

This alternative is highly reliable as it targets an easily identified and collected part of the waste stream and generates positive feelings and opinions toward the University. The material produced is reasonably consistent in appearance. The public eagerly takes all of the material made available.

Process Alternative 2. Change to Yard Waste and Manure Composting Process

Yard waste, ag crop residue and manure composting takes advantage of naturally occurring biological decomposition of organic materials. Controlling, to the extent possible, the conditions of biological decomposition allows this process to occur efficiently. In general, composting techniques provide for a high surface-to-volume ratio, allowing greater surface area for bacterial and fungal action; a carbon/nitrogen ratio that best supports a thriving bacterial population; porosity or free air space to allow microorganisms to "breathe"; and sufficient moisture levels.

General Technology Description

There are three general composting techniques potentially available:

- Windrow composting. Most existing composting operations in the United States use the windrow method, the simplest composting system. Workers build windrows (elongated piles) of compost material, periodically turn the windrows, and control moisture and temperature levels. Composting efficiency depends primarily on a good carbon/nitrogen ratio, proper moisture, and turning frequency to allow sufficient aeration.

- Aerated static piles. This method operates on principles similar to windrow composting. Aeration is artificially provided to the composting mass (e.g., by forming the piles over perforated pipes that draw air through the compost), which allows the size of the piles to be increased and the need for turning the piles largely to be eliminated. More controlled aeration leads to swifter decomposition and better odor control, especially in systems that filter air after it is drawn down through the piles. The land area needed is somewhat less than that needed for windrows.

- In-vessel composting. In-vessel composting takes place in an enclosed container rather than in free-standing piles. Some proprietary systems are available. Each provides for some type of combining, size reducing, and mixing of the composting mass and monitoring of temperature, moisture, and nutrient levels, which result in increased throughput, odor control, and consistent product quality. These systems have high equipment costs, but generally require less land than windrow systems. Most in-vessel systems still require some form of windrow composting or aerated static piles to achieve a thoroughly stabilized product.

Effectiveness

The Waste Generation Study identified 6,244 tons of green waste and manure, 34.9 percent of UC Davis' total waste stream. Manure contributes 5,046 tons or 28.2 percent of the waste stream. Expansion of the existing program to include all uncontaminated manure and 50 percent of the currently diverted wood waste, 25 percent of the currently disposed wood waste and 100 percent of the currently disposed grass, leaves and prunings which equals 660 tons, can divert 31.9 percent of the waste stream.

Hazards

Common hazards of composting operations include fire, vectors, odors, blowing material, and run-off.

Ability to Accommodate Change

Any change in quantity and/or quality of source separated materials can be accommodated by changing collection patterns and frequency and/or increased educational activities.

Consequences on Waste Stream Composition

Composting reduces the total amount of waste destined for burial in the landfill, thereby helping the University to achieve AB 939 diversion goals.

Ability to Be Implemented

Composting manure delivered to the site is already implemented. Adding additional manure can be implemented once collection methods are selected, space is designated, and a windrow turner is available. Adding yard waste and wood can be implemented once permits are issued by the CIWMB.

Need For Facilities

The existing site is sufficient in size to accommodate the processing of all the manure and wood waste generated on campus. A front loader collection vehicle is part of the collection fleet now. A tub grinder, compost turning mechanism and front loader tractor will be needed to produce a material suitable for end-use.

Consistency with Applicable Local Policies, Plans, and Ordinances

Expansion of the existing program does not conflict with local policies, plans or ordinances.

The CIWMB Facilities permit will need revision.

Institutional Barriers to Implementation

There are no institutional barriers to expanding the existing program. Some generator inability to provide non-contaminated material is an institutional barrier to composting the maximum amount of the compostable waste generated on campus. Expanding the program to include yard waste and wood requires successful completion of the five year permit review of the 1978 solid waste permit, in process since 1983.

Cost

One full time employee would be needed to process the material, assist end-users with loading, keep records and maintain equipment. Start up equipment costs could reach $120,000. Annual labor and benefits at the current rate is $41,000.

Operational costs for conventional windrow processes vary between $6 and $18 per ton of yard waste processed.

Market Availability

The compost would be given free of charge to the public or sold if market conditions would allow.

Technical Reliability/Public Acceptance/Markets

All manure currently composted is taken away by the public, free of charge. This improved method is reliable and would be supported by the community. Perhaps some surplus would be available for the Physical Plant Grounds department to use as soil additives.

Process Alternative 3. Anaerobic Composting

Anaerobic composting is the process of producing compost without air. This process produces two products: compost and biogas. Biogas is a mixture of approximately 50 percent carbon dioxide and 50 percent methane. The biogas can be burned to generate electricity or it can be upgraded to pipeline quality natural gas and sold to utilities. The compost product that is produced is similar to that which is produced in aerobic processes.

The Department of Civil Engineering of UC Davis is currently under a contract with the Prison Industry Authority to demonstrate the technical feasibility of the high-solids anaerobic digestion/aerobic composting process for the processing of the organic fraction of MSW.

Effectiveness

This option is effective at removing compostable materials from the waste stream, but its expense and complexity render this option generally inapplicable to yard waste unless the input stream is at least 30 tons per day.

Hazards

The common hazards associated with composting facilities are odors, contaminants and leachate. Vectors can be a problem if the process is not properly operated. There can be hazards associated with equipment operation, but these will be minimized by properly training the equipment operators.

The most common complaint directed at composting facilities is the odor. Anaerobic composting offers better odor control than conventional windrow processes. Since the process is enclosed, no odors should be present that cannot be controlled and treated.

The presence of contaminants in the final product can be disastrous to marketing efforts. This hazard can be avoided by visually screening the input waste stream for contaminants and removing them before the material is placed in an enclosed windrow or vessel.

The leachate that is generated from the composting process can potential contaminate local water sources. This can be controlled by collecting and treating or recycling the effluent.

Ability to Accommodate Change

Anaerobic composting is adaptable to many economic, technological, and social changes. It can easily be converted to an aerobic composting facility.

Consequences on Waste Stream Composition

A composting facility will result in a decrease in the amount of organic material received at the local landfill.

Ability to be Implemented

An anaerobic composting facility can be implemented. Approximately two years would be required to site, permit, and build the facility.

Need for Facilities

A site will be needed for the composting operation.

Consistency with Local Policies, Plans, and Ordinances

There are no conflicting policies, plans, or ordinances that would affect a composting facility. Depending on the location, a permit from the State Regional Water Quality Board may be required for disposal of the leachate that is generated. The CIWMB will require a solid waste facility permit.

Institutional Barriers to Implementation

There are no institutional barriers to composting yard waste. If the University decides to move into sewage sludge composting in the future, there may be institutional barriers to the use of the final product. Sewage sludge composting is currently under review by the EPA. The EPA is due to release their sludge regulations in 1992.

Costs

Typical costs for a composting facility consist of collection alternatives, processing, storage, marketing, program administration, public education, and technical assistance. These costs are offset by the benefits which include: revenues received from selling the finished compost (if any), and avoided costs from using the finished compost instead of purchasing similar product. An added revenue from anaerobic composting is the sale of gas.

Anaerobic composting is not widely practiced, thus no detailed costs are available. A rough estimate of processing costs is $40 to $50 per ton.

Market availability

The compost may be given away free or used for landfill cover if it passes state qualification guidelines for a suitable cover material.

Technical Reliability/Public Acceptance

Anaerobic composting techniques, although not in common use, are relatively simple and reliable once the system has been designed and installed.

Process Alternative 4. Add MSW Composting

Although relatively uncommon in the United States, MSW composting is widely used for solid waste stabilization and disposal in other parts of the world. Most systems are proprietary and are associated with materials recovery. Successful MSW composting presupposes an existing recycling infrastructure (i.e., curbside collection). MSW composting requires high levels of mechanization and control systems and is suited to large volumes of waste. In assessing the potential for this type of program, consideration must be given to the diverse waste stream, land requirements (5 to 20 acres or more depending on scale and technology employed), cost, and environmental issues related to residuals disposal and of the end-product. MSW composting can be used to reduce waste volume, with the end-product destined for landfilling or use as a soil conditioner or mulch, depending on compost quality and local environmental considerations.

MSW composting uses three steps:

- Processing - reducing particle size by shredding or grinding, materials separation to eliminate noncompostables, mixing to produce homogeneous composting mass
- Composting - uses combination of in-vessel, static pile and windrow systems, both aerobic and anaerobic
- Postprocessing - screening and curing to produce the finished product.

Effectiveness
Depending on ultimate disposition, it could reduce the amount of organic material being buried.

Hazards
Hazards could include vectors, odors, run-off, fires .

Ability to Accommodate Change
MSW composting is adaptable to many economic, technological, and social changes. It can easily be converted to an aerobic composting facility.

Consequences on Waste Stream Composition
An MSW composting facility will result in a decrease in the amount of MSW received at the landfill.

Ability to Be Implemented
Local and state permits would need to be obtained and CEQA compliance would be required.

Need for Facilities
A new major facility and land would be needed.

Consistency with Applicable Local Policies, plans, and Ordinances
MSW composting generally is consistent with the policies set forth in the 1989 revision of the County Solid Waste Management Plan regarding conservation of natural resources, resource recovery from solid waste, and diversion of waste from landfills.

Institutional Barriers to Implementation
Due to capital costs of a materials recovery facility, MSW composting likely would require a county-wide or regional facility, requiring agreements with all member cities and areas. No other city in Yolo County is pursuing this option as part of their AB 939 planning process, thus presenting a barrier. The siting and construction of a MSW composting facility would be subject to county planning and zoning ordinances. No other explicit barriers to implementation were identified.

Cost
Although capital and operating costs depend on the type and scale of the program selected, MSW composting typically costs between $40 and $80 per incoming ton and produces residuals that must be landfilled. Most available systems offered by vendors are integrated with materials recovery facilities and use proprietary technologies. Systems providing the highest compost quality often recover the least amount of material as compost and generally produce larger fractions of recyclables.

Market Conditions
The marketability of MSW compost is questionable. The material has real and perceived deficiencies, relative to yard debris compost. Under AB 939, the potential abundance of yard debris compost produced by California's cities and counties may limit end uses of MSW compost to certain municipal projects and landfill cover.

Process Alternative 5. Wood and Green Waste Chipping

Wood and green waste is currently being stockpiled in a separate area of the landfill. The potential composting of this material has been addressed in previous alternatives. An alternative to composting would be to chip this material and use it as mulch within the University or sell it for transformation.

Effectiveness

The waste generation analysis identified the following material that is potentially available for chipping:

Material Type	Amount Currently Diverted or Transformed	Amount Currently Disposed	Projected Recovery Rate	Additional Amount Collected	Total Projected Amount Collected
Wood, Brush, Straw	561	0	50%	0	280
Grass/Leaves	0	118	100%	118	118
Prunings	47	223	100%	176	223
Wood Waste	0	343	25%	86	86
Totals	608	684	56%	380	707

If this material were used for mulch or transformation, approximately 3.7 percent of the waste stream generated could be removed from the landfill.

Hazards

Common hazards of chipping/grinding operations include fire, vectors, odors, blowing material, and run-off.

Ability to Accommodate Change

Any change in quantity and/or quality of source separated materials can be accommodated by changing collection patterns and frequency and/or increased educational activities.

Consequences on Waste Stream Composition

Chipping reduces the total amount of waste destined for burial in the landfill, thereby helping the University to achieve AB 939 diversion goals.

Ability to Be Implemented

Separation of some of the material delivered to the site is already implemented. Adding additional material can be implemented once collection methods are selected.

Need For Facilities

The existing site is sufficient in size to accommodate the processing of all the targeted waste generated on campus. A front loader collection vehicle is part of the collection fleet now. A tub grinder/chipper and front loader tractor will be needed to produce a material suitable for end-use. Alternately, the chipping could be performed by a contractor with mobile equipment.

Consistency with Applicable Local Policies, Plans, and Ordinances

Expansion of the existing program does not conflict with local policies, plans or ordinances. The CIWMB Facilities permit will need revision. A local air quality permit may be required.

Institutional Barriers to Implementation

There are no institutional barriers to expanding the existing program.

Cost

A contractor with mobile equipment would chip the material for approximately $35 to $45 per ton. This cost could be offset if the material is sold for transformation. (However, this may not be possible due to the small amount of material collected)

Due to the relatively small amount of material generated, the purchase of equipment at from $75,000 to $150,000 is not economical. The 707 tons of material could be processed at a cost of from $23,000 to $30,000 annually.

Additionally, a one-quarter time university employee (0.25 x $41,550 = $10,380) will be needed to monitor the segregation and placement of the material. Thus total cost will be approximately $40,000/yr.

Market Availability

The University can use the material made available at 3/4" to 1-1/2" nominal size or the material may be given away free or used for landfill cover if it passes state qualification guidelines for a suitable cover material.

Technical Reliability/Public Acceptance

This alternative is highly reliable as it targets an easily identified and collected part of the waste stream and generates positive feelings and opinions toward the University. The material produced will be reasonably consistent in appearance.

6.3.3 Siting Alternatives

Sites that may be appropriate as a composting facility include:

- Buffer areas around landfills
- Waste water treatment facilities
- Large, unused paved areas
- Buffer areas around industrial sites and institutions
- Utility rights-of-way
- Unused State or Federal lands in the area

While it may be possible to have a site to serve one jurisdiction, centralized regional sites are often preferred on the basis of economies of scale, space availability, and administrative convenience.

The selection of a composting site requires careful consideration of, among other parameters:

- Proximity to the waste stream
- Proximity to potential markets
- Potential for using the land at no direct cost
- Distance from residential and other sensitive land uses
- Size (area)
- Accessibility
- Public acceptance
- Physical site conditions
- Need for permits
- Availability of utilities
- Current and adjacent land uses
- Need for improvements

Three primary options for siting a composting facility are:

- The existing site at the UCD landfill
- A new campus site adjacent to the UCD landfill
- A privately owned and operated site off campus

A composting facility will have to go through a permitting process that may impact where the site is located. A summary of the permitting steps is as follows:

1. County planning department
   - Use permit
   - CEQA evaluation and determination
   - EIR or Negative Declaration

2. Public Works Department and Waste Advisory Committee for AB 939
   - Concurrence of proposed project needed
   - No permit requirements

3. Department of Public Health
   - Solid Waste Facility Permit or exemption from permit required

4. California Integrated Waste Management Board
   - Solid Waste Facility Permit via Department of Public Health
   - Planners review for CEQA compliance

5. Regional Water Quality Control Board
   - Waste Discharge Permit: Required if there is leachate generation

6. Air Pollution Control District
   - PM-10 permit requirements: Permit required for equipment that generates dust particles of less than 10 microns

If only manure is composted, the CIWMB Facilities Permit is not required but all other conditions must be met.

Siting Alternative 1. Continue to Use Existing Site at Landfill

UC Davis currently has its manure processed at the University owned and operated landfill. The facility is sufficient to accommodate all yard waste materials generated within UC Davis. The current program is successful and cost effective.

Effectiveness

The local site is very effective for composting the manure and yard waste generated by the University.

Hazards
Common hazards of composting operations include fire, vectors, odors, blowing material, and run-off.

Ability to Accommodate Change
A local composting facility is more likely to adapt to specific local changes in a community than a regional site.

Consequences on Waste Stream Composition
A composting facility processes organic wastes otherwise sent to landfills.

Ability to be Implemented
A manure spreading facility is already in operation. The facilities permit will require revision to include composting.

Need for Facilities
Paving of a portion of the site may be required

Consistency with Local Policies, Plans, and Ordinances
There are no conflicting policies, plans, or ordinances that would affect continued use of the existing facility. The CIWMB will require a solid waste facility permit revision if greenwaste is added.

Institutional Barriers to Implementation
Issuance of a revised facilities permit

Costs
Since the existing site is already available, there are no incremental costs associated with this alternative. However, should a portion of this site be paved for operational reasons, then some additional cost would be incurred by this alternative.

Market Availability
All material produced at this site will be used by the University or given to the public free of charge (or sold if market conditions allow).

Technical Reliability/Public Acceptance
The existing facility is highly reliable and enjoys considerable public acceptance.

Siting Alternative 3. Change to Centralized Regional Site or New Private Site

A centralized County or city site that is utilized by manu jurisdictions has, among other advantages, economies of scale in processing and administrative continuity. A major disadvantage is the greater transport time and cost from collection point to processing location. The site could either be on County property or on other public or private property.

Composting sites are often located at unused portions of landfills or transfer stations. This tends to create a more efficient integrated waste management system. Permitting lags, if any, are usually minor, and equipment and personnel can be shifted relatively easily between the landfill and the composting sites as necessary. If only manure is composted on a separate site, a CIWMB Facilities Permit is not required but all other State minimum standards must be met.

Effectiveness

A centralized regional site will be effective at composting the yard waste generated in the City of Davis as well as the yard waste generated throughout the region. It will raise the cost of collection because of the increased distance the yard waste has to be hauled but will decrease the initial equipment costs as they will be shared by all jurisdictions using the facility. This compost process would be as effective as the collection system that feeds it (see collection alternatives for specific quantities).

Hazards

Common hazards of composting operations include fire, vectors, odors, blowing material, and run-off.

Ability to Accommodate Change

A regional center may not adapt as readily to local changes as a local facility because of the influence of other jurisdictions.

Consequences on Waste Stream Composition

A composting facility will process organic wastes otherwise sent to landfills.

Ability to be Implemented

A regional facility may take longer to site than a local facility, but there may be more sites to choose from. A regional facility may be able to be implemented in the short-term planning period.

Need for Facilities

The City of Davis currently has its yard waste processed at a locally owned and operated facility. The facility is sufficient to accommodate all yard waste materials generated within Davis. However, UCD has been advised that the operator of this facility will not accept additional material from the University due to difficulties marketing existing compost.

Consistency with Local Policies, Plans, and Ordinances

Use of a regional facility will require reduced or eliminated use of the local facility. This may directly conflict with City policies.

Institutional Barriers to Implementation

State and local permitting requirements must be met as well as CEQA. Section 40200 of the public resources code states that a transfer or processing station or station does not include a facility, whose principal function is to receive, store, separate, convert, or otherwise process in accordance with State minimum standards, manure.

6.4 SELECTION OF PROGRAMS

6.4.1 COLLECTION ALTERNATIVES SELECTED

This section will describe the programs selected by UC Davis for implementation during the short- and medium-term planning period.

The following collection programs have been selected by the University for implementation.

COLLECTION ALTERNATIVE 1.

Expand Source Separated Collection

Currently, manure is delivered to the landfill by Animal Science Department workers. In addition to the Animal Science Department, the following areas generate potential compostable manure, straw, bedding, etc.:

Equestrian Center
Avian Science
Animal Resource Center

- Cage Wash
- Bedding Straw

Veterinary Medical Teaching Hospital
- Bedding Straw
- Haring Hall

Medical Science
- Shavings

Sheep and Beef Barns
Cole Facility
Grounds Trailers

(Wildlife Fisheries Biology

Feed Mill

Ag Service

Aquatic Weed Control

Viticulture

This alternative will expand collection to the areas listed above. Pick up of separated compostable material will replace pick up of mixed waste.

6.4.2. COLLECTION ALTERNATIVES NOT SELECTED

The following collection programs have been rejected by the University

Collection Alternative 2. Mandate Delivery of Source Separated Material

This alternative would shift the cost and responsibility of delivering the separated material to the individual departments that generate the waste. This would decrease the solid waste department costs but would increase the costs of each of the other departments involved. Additionally, each department would need to address the logistics of delivering the material. This alternative has been rejected in order to keep the collection and delivery of the material centralized.

6.4.3. COMPOSTING PROCESS ALTERNATIVES SELECTED

The following process programs have been selected by UC Davis for implementation in the short term planning period.

Alternative 1. Continue and Expand Existing Manure Composting

Alternative 5. Wood and Green Waste Chipping

The selection of these two alternatives will allow the University to divert up to 100 percent of the waste identified in Table 6.1 for a minimal cost. The manure processing program will be expanded to include the equestrian center and avian sciences. The addition of a compost turner in the intermediate planning period could increase the type, amount and quality of material that could be processed.

6.4.4 PROCESS ALTERNATIVES NOT SELECTED

The alternatives were not selected due to cost, difficulty in implementation, and no appreciable increase in diversion over the selected alternatives:

Alternative 2. Change to Yard Waste and Manure Composting Process.
Alternative 3. Change to Anaerobic Composting
Alternative 4. Add MSW Composting

6.4.5 FACILITY SITING ALTERNATIVES SELECTED

The following compost facility siting alternative has been selected by UC Davis for implementation in the short-term.

Facility Siting Alternative 1. Continue to Use Existing Site at Landfill

This alternative has been selected since the facility already exists and is deemed highly effective.

6.4.6 FACILITY SITING ALTERNATIVES NOT SELECTED

The following composting facility siting alternative has been rejected by the University

Alternative 2. Change to New Campus Site
This alternative has been rejected due to relative ease that is expected in the continued use of the existing site. However, should landfill permitting issues prevent Alternative #1 from moving forward, then this alternative will be reconsidered.

Alternative 3. Change to Centralized Regional Site
This alternative has been rejected since a facility on campus already exists and is deemed highly effective.

6.5 PROGRAM IMPLEMENTATION

This section will include a schedule of implementation for tasks, costs, responsible entities, and funding sources for each selected program.

TABLE 6-2. IMPLEMENTATION SCHEDULE FOR EXPANSION OF EXISTING COLLECTION PROGRAM

Task	Responsible Party	Start Date*	Completion Date*	Estimated Cost
Develop Promotional Material	Physical Plant	1/96	3/96	See Education Component
Disseminate Material	Physical Plant	3/96	Ongoing	See Education Component
Promote Program	Physical Plant	3/96	Ongoing	See Education Component
Identify and Contact Specific Large Generators	Physical Plant	1/96	Ongoing	See Education Component
Revise Collection Truck Allocation	Physical Plant	1/96	Ongoing	None

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

TABLE 6-3. IMPLEMENTATION SCHEDULE FOR EXPANDING SPREAD AND DRY PROCESS

Task	Responsible Party	Start Date*	Completion Date*	Estimated Cost
Collect, additional manure and process	Physical Plant	1/96	Ongoing	None
Obtain Compost Turner	Physical Plant	1/96	3/96	$50,000 to $60,000
Process and Distribute Manure	Physical Plant	Ongoing	Ongoing	$53,000/yr

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

TABLE 6-4. IMPLEMENTATION SCHEDULE FOR ADDITION OF WOOD WASTE CHIPPING

Task	Responsible Party	Start Date*	Completion Date*	Estimated Cost
Contract with Chipping Firm	Physical Plant	Completed	Completed	
Chip Material Annually	Physical Plant	3/96	Ongoing	$40,000/yr

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

6.6 MONITORING AND EVALUATION

To ensure that the composting program is meeting its goals and objectives, the program should be monitored and evaluated on a regular basis. Monitoring should include the following measures:

- Recording by the University or its agent of the estimated cubic yards of materials accepted for processing at the composting site, on a daily basis.
- Recording by the University or its agent of the estimated cubic yards or tons of reject materials that require disposal after pre- or post-processing, on an as applicable basis
- Recording by the University of the estimated cubic yards of materials deposited and accepted at the composting site, on a daily basis
- Other supplementary measures as deemed necessary or desirable

A periodic waste generation study should be undertaken by the University to evaluate changes in the disposal levels of materials targeted or that could be targeted by the composting program. Data gathered in the waste generation study should be compared with date gathered in the 1991 study conducted for the University.

The effectiveness of the composting program (including on-site composting and other organic waste reduction techniques) should be gauged in the intermediate term (by year 2000) as follows, subject to modification in accordance with State guidelines:

- Zero to 25 percent diversion of targeted waste, unsatisfactory
- 25 to 50 percent diversion of targeted waste, needs improvement
- 50 to 66 percent diversion of targeted waste, effective
- Greater than 75 percent of targeted waste or greater than 21 percent diversion (attributable to manure, yard and wood waste) of all solid waste by the University, highly effective

Funding requirements for the monitoring program will include those for recordkeeping to document quantities of targeted waste diverted and quantities of solid waste disposed.

Shortfall Implementation

In the event that the composting program is deemed unsatisfactory or in need of improvement, based on the evaluation criteria above, the University should re-assess their strategies in meeting their solid waste diversion objectives. Possible remedial strategies that should be considered include:

- Targeting additional materials for composting
- Allocating greater resources, such as for administrative staff time and public education and publicity
- Mandating the source separation of manure, yard and wood waste
- Evaluate the feasibility of composting MSW

SECTION 7

SPECIAL WASTE COMPONENT

Special wastes are defined by the California Integrated Waste Management Board as "any hazardous waste listed in Section 66740 of Title 22 of the CCR". These include:

- Ash from burning of fossil fuels, biomass, and any other combustible materials
- Auto shredder waste
- Baghouse and scrubber wastes from air pollution control
- Catalyst from petroleum refining and chemical plant processes
- Cement kiln dust
- Dewatered sludge from treatment of industrial process water
- Dewatered tannery sludge
- Drilling mud from drilling of gas and oil wells
- Refractory from industrial furnaces, kilns and ovens
- Sand from sandblasting
- Sand from foundry castings
- Slag from coal gasification
- Sulfur dioxide scrubber waste from flue gas emission control in combustion of fossil fuels
- Tailings from the extraction, benefication and processing of ores and minerals

In addition to those materials specifically identified in Section 66740 of the CCR as special wastes, other materials that are not normally disposed of with other municipal solid waste and require special handling practices have also been classified as special wastes within this Source Reduction and Recycling Element. These include:

- Tires
- Scrap metal (used appliances, water heaters, and other bulky metal objects)
- Construction and demolition debris (wood, wallboard, piping, asphalt, concrete, etc.)
- Dead animals
- Manure
- Agricultural waste
- Medical waste

Sources on the UCD campus generate many of these special wastes. This component discusses the University's current handling and disposal practices, and presents new and existing programs that will be implemented (or continue to be operated) to divert special wastes away from landfill disposal and towards facilities that will handle and dispose of it safely, or convert the material for beneficial reuse or recycling.

7.1 GOALS AND OBJECTIVES

UCD has been actively involved in programs which ensure the safe handling and disposal of special wastes, as well as the diversion of some materials for reuse or recycling. It is UCD's intention to continue to operate these programs throughout the short-term and medium-term planning periods. Summarized below are the specific goals and objectives associated with those programs that will contribute towards UCD's waste diversion rate.

7.1.1 Source Reduction Programs Selected Implementation and Diversion Objectives

After giving consideration to the existing source reduction programs, and the additional special waste alternatives evaluated in Section 7.3, UCD has selected the programs presented in Table 7-1 for continued operation in the short-term and medium-term planning periods.

Table 7-1 Selected Special Waste Program Alternatives

Selected Program	Program Description/Name
Alternative #1	Continue use of asphalt and concrete as roadbed material
Alternative #2	Continue source separation and special collection of scrap metals
Alternative #3	Continue source separation and special collection of wood wastes
Alternative #4	Continue tire salvaging at landfill

Shown below in Table 7-2 is the anticipated diversion from the selected special waste programs in 1992. Over time, these quantities are expected to increase in proportion to increases in UCD's total waste generation. Thus the diversion rate associated with these efforts is expected to remain constant throughout the short-term and medium-term planning periods.

Table 7-2 Diversion Associated with Selected Special Waste Programs

Selected Special Waste Programs	Diverted Material Types	Estimated Amount Diverted (tons per year)	Percent of Total Waste Stream Diverted
Alternative #1: Continue use of asphalt and concrete as roadbed material	* Asphalt * Concrete	3,128	17.5%
Alternative #2: Continue source separation and special collection of scrap metals	* Scrap Metals	232	1.3%
Alternative #3: Continue source separation and special collection of wood wastes	* Wood	250	1.4%
Alternative #4: Continue tire salvaging at landfill	* Tires	<0.1%	<0.1%
		3,610	20.2%

7.1.2 Targeted Materials for Special Waste Programs

The material types targeted for diversion by the selected special waste programs are listed in Table 7-3.

Table 7-3 Material Types Targeted by Special Waste reduction Programs

Selected Special Waste Programs	Targeted Material Types
Alternative #1: Continue use of asphalt and concrete as roadbed material	* Asphalt * Concrete
Alternative #2: Continue source separation and special collection of scrap metals	* Scrap Metals
Alternative #3: Continue source separation and special collection of wood wastes	* Wood
Alternative #4: Continue tire salvaging at landfill	* Tires

7.2 EXISTING CONDITIONS

Most special waste materials are not disposed of in the UCD landfill. UCD Physical Plant Staff and the Office of Environmental Health & Safety conduct a number of programs to ensure the safe handling and diversion or disposal of the designated special waste materials. Presented in Table 7-4 are the current amounts of special waste materials that are diverted from landfill and count towards the University's overall diversion rate (note - not all special waste material types can be counted towards fulfillment of the AB 939 diversion requirements).

Table 7-4. Total Diversion Associated with Existing Special Waste Diversion Programs

Material Type	Amount Diverted (tons per year)
Scrap Metals/White Goods	228
Concrete and Asphalt	3,135
Wood (demolition debris)	561
Dead animals	211

Summarized below are descriptions of the existing handling, diversion, and disposal practices associated with each of the special waste materials types.

7.2.1 Sewage Sludge

UCD has on-campus waste water treatment facilities which produce sewage sludge. These facilities are owned and operated by UCD. The sludge is regularly collected in tanker trucks at the Waste Water Treatment Plant in a liquid form and then transported and pumped into large drying beds located at the Primate Center and then stockpiled at the south end of the drying beds. This operation produces approximately 135 tons of powdery dry sludge annually. Up until 1988, the dried sludge was taken to the UCD landfill for disposal. At that time, UCD was instructed by the Local Enforcement Agency (LEA) to discontinue this practice. However, in 1991, the Yolo County LEA informed UCD that landfill disposal of the dried sludge would be permitted under the terms of a Notice and Order issued to UCD by the CIWMB.

7.2.2 Tires

Tires are not allowed to enter the UCD landfill for disposal. However, occasionally tires are found in the disposed waste stream at the working face of the landfill. These tires are pulled from the waste and stored in a separate area at the landfill until a sufficient number has accumulated to justify delivery to a Sacramento firm.

7.2.3 Scrap Metal Waste

In 1980, Salvage Operations was transferred from the Equipment Inventory Department to the Central Stores/Receiving Department. The purpose of Salvage Operations was to provide an alternative to the disposal of bulky waste, metals and equipment (desks, file cabinets, fencing, pipe, etc. in the campus landfill through recycling and reuse. Salvage Operations was staffed by two full-time University employees who used a two-ton truck, forklift and hand trucks to perform this work. On July 1, 1982, the collection and disposal of campus salvage materials was contracted out to Zadnik Enterprises. Records indicate that 1.4 tons of miscellaneous salvage materials was sold in fiscal year 1981-82. The amount of materials collected in this time period is not available. During fiscal year 1982-82, 143.8 tons of salvage materials were collected, and thus, diverted from burial in the campus landfill.

On July 1, 1983, responsibility for the Salvage Operations was moved to the Solid Waste Section of Physical Plant because income no longer was sufficient to offset operating expenses and to consolidate waste collection functions in order to reduce direct costs.

A loading ramp and roll-off bins were installed at the campus landfill in 1985. A contract with Schnitzer Steel provided the bins, on-call removal services and income based on current market value of the material collected. In 1990, 228 tons of scrap were removed, generating $5,407 in revenue.

Currently, large-bulky metal items continue to be collected separately by Physical Plant staff and brought to the landfill where they are stockpiled in roll-off bins until a sufficient quantity has accumulated. Collection is done on an as-needed basis, with various campus departments calling the Physical Plant staff when they have material to be collected.

A separate program to recycle precious metals from circuit boards was established in 1989 with Micro Metallics Corporation in San Jose, who provided collection bins and pick up services.

7.2.4 Wood Waste

In September, 1982, the Yolo County Health Services Agency approved a plan to recycle pallets and wood scrap at the campus landfill. In 1990, 523 tons of materials were diverted to the wood diversion area (demolition debris, stumps, etc.). The public is welcome to remove pallets, logs and scrap. With the installation of a computerized landfill scale, it is possible to weigh the materials removed for re-use. When the pile is large enough, remaining brush and wood scrap will be given to a vendor with a mobile grinding operation (See Composting Component for additional details).

7.2.5 Concrete and Asphalt

Concrete and asphalt are regularly generated wastes by private contractors and Physical plant crews as they repair roads and engage in construction and demolition projects. This type of material is brought to the landfill separate from other types of waste and is stored in a designated area. Once at the landfill, the material is crushed by driving over it with heavy loading and grading equipment. Crushed material that is less than 6 inches in diameter is then used as a roadbase at the landfill. None of the concrete or asphalt (except that containing rebar or steel) is disposed of in the active area of the landfill.

7.2.6 Dead Animals

Dead animals are brought to the pathological crematory at the Waste Water Treatment Facility and incinerated.

7.2.7 Pathological Crematory Ash

As mentioned in 7.2.6, dead animals are brought to the pathological crematory at the Waste Water Treatment Plant Facility and incinerated. The ash generated by this process is stored in sealed trailers and then tested for harmful toxins, contaminants, and pollutants. Once determined to be safe, the ash is then sent to the landfill for final disposal.

7.2.8 Manure

Manure is generated in many areas of the campus where there is livestock. In about one-half of the cases, manure is brought to the landfill separately from other solid wastes by the various departments that have livestock. The clean manure (i.e. free of straw and other materials) is dumped at the landfill in a designated area where it is dried. The material is then given away free of charge to farmers and the general public for use as a soil amendment. One hundred percent of the clean, dried manure is removed from the landfill and used for beneficial purposes. Manure that is mixed with bedding straw is disposed of in the landfill.

7.2.9 Agricultural Waste

Agricultural waste generated by the growing and harvesting of crops by UCD departments on campus property are typically plowed back into the soil and do not enter the waste stream. Baled straw is given away and weighed when removed.

7.2.10 Medical Waste

Medical waste includes biohazardous and/or infectious waste materials. EH&S coordinates medical waste disposal. Chemical or heat sterilization, incineration, or disinfection and disposal to the sanitary sewer treats most liquid wastes. Most waste is sterilized by laboratory staff, although EH&S personnel pick-up containers of sharps (needles, scalpels, etc.) for incineration by an off-site vendor. Except for sharps, EH&S personnel generally do not perform medical waste collection and disposal, and most of the wastes do not pass through the HWMF.

7.3 EVALUATION OF SPECIAL WASTE PROGRAM ALTERNATIVES

As described in Section 7.2, UCD has in place a number of programs which divert significant amounts of special waste materials. Continued operation of these programs are the special waste program alternative that have been evaluated. Each is described below:

Alternative #1
Continue use of asphalt and concrete as road bed material

As described in Section 7.2.5, concrete and asphalt are regularly generated wastes by private contractors and Physical plant crews as they repair roads and engage in construction and demolition projects. This type of material is brought to the landfill separate from other types of waste and is stored in a designated area. Once at the landfill, the materials is crushed by driving over it with heavy loading and grading equipment. Crushed material that is less than 6 inches in diameter is then used as a roadbase and for a winter dumping pad at the landfill. None of the concrete or asphalt (except that containing rebar or steel) is disposed of in the active area of the landfill. This alternative program involves the continuation of the current program, with no substantive changes.

Effectiveness
This program currently diverts approximately 3,135 tons of concrete and asphalt from landfill disposal per year. This represents 17.5 percent of the total waste generated. This program is expected to continue to divert material at this rate throughout the short-term and medium-term planning periods.

Hazards
This program does not pose any significant environmental or safety hazards.

Ability to Accommodate Change
This program should accommodate changes such as quantities of asphalt and concrete received (different than what is expected), economic issues, market conditions, etc., since all of the material is processed and used at the landfill.

Consequences on Waste Stream
Removing the concrete and asphalt from the disposed waste stream significantly reduces that total amount of waste disposed in the UCD landfill. No consequences other than reduced volume and weight are anticipated.

Ability to be Implemented
This program is already in operation. Continuation of the program poses no implementation problems.

Need for Facilities
This program is conducted at the landfill and requires no facilities. The asphalt and concrete is brought into the landfill by private contractors and Physical Plant staff and is stockpiled in a designated area. Processing the material to reduce it to a usable size involves driving over it with heavy machinery (bulldozer, grader, etc., that is already available at the landfill and primarily used for landfill operations).

Consistency with Local Policies and Plans
This program does not conflict with any Federal, State, County, CIWMB, or UCD policies, procedures, or plans.

Institutional Barriers to Implementation
This program is already in operation. Continuation of the program poses no problems.

Costs

Asphalt and concrete are brought to the landfill by private contractors and UCD departments engaged in road repair and construction/demolition projects. Cost for bringing the material to the landfill are assumed to be zero, for purposes of evaluating this alternative (since disposal of the concrete and asphalt material should be included in the cost of the road repair projects). Actual diversion of the material involves the periodic crushing of the stockpiled material down to a usable size by driving over it with heavy machinery (bulldozer, grader, etc., that is already available at the landfill and primarily used for landfill operations). The material is then placed in a selected area at the landfill for use as a roadbed. This crushing and moving operation is done once every two years, on average, and costs an estimated $7,200 each time. This cost includes labor provided by Physical Plant Staff and allocated costs of equipment leased from UCD Agricultural Services.

Market Availability

All diverted concrete and asphalt is used at the landfill as roadbed material.

Alternative #2

Continue source separation and special collection of scrap metals/white goods.

As described in Section 7.2.3, Physical Plant provides an on-call collection service to the entire campus to collect large metal waste types. Typically, this includes metal furniture and equipment that can't be sold by the UCD Bargain Barn, (piping, fencing, etc.). The material is brought to the landfill and stockpiled in large roll-off type debris boxes and is then periodically collected as scrap metal by a salvage company in the Sacramento area.

This alternative program involves the continuation of the current program, with no substantive changes.

Effectiveness

This program currently diverts approximately 230 tons of metals found in white goods, metal furniture, piping, fencing, etc. from landfill disposal per year. This represents 1.3 percent of the total waste generated. This program is expected to continue to divert material at this rate throughout the short-term and medium-term planning periods.

Hazards

This program does not pose any significant environmental or safety hazards.

Ability to Accommodate Change

This program should accommodate changes, such as quantities of material received (different than what is expected), economic issues, market conditions, etc., since the material is stockpiled at the landfill in roll-off bins and removed by a private salvage company.

Consequences on Waste Stream
Removing the large metal objects from the disposed waste stream reduces the total amount of waste disposed in the UCD landfill. No consequences other than reduced volume and weight are anticipated.

Ability to be Implemented
This program is already in operation. Continuation of the program poses no implementation problems.

Need for Facilities
This program is conducted at the landfill and requires no facilities. The material brought into the landfill by Physical Plant Staff and is stockpiled in a designated area. Periodically, the materials are collected by a private salvage company.

Consistency with Local Policies and Plans
This program does not conflict with any Federal, State, County, CIWMB, or UCD policies, procedures or plans.

Institutional Barriers to Implementation
This program is already in operation. Continuation of the program poses no problems.

Costs
Costs for this program involve the collection process performed by Physical Plant Staff. These costs include labor and equipment and amount to approximately $32,300 annually.

Market Availability
All scrap metal material collected is removed from the designated stockpile area at the landfill by a private salvage company in the Sacramento area.

Alternative #3
Continue source separation, special collection, and processing of wood waste

As described in Section 7.2.4, in September, 1982, the Yolo County Health Services Agency approved a plan to recycle pallets and wood scrap at the campus landfill. In 1990, 523 tons of materials were diverted to the wood diversion area (demolition debris, stumps, etc.). The public is welcome to remove pallets, logs and scrap. With the installation of a computerized landfill scale, it is possible to weigh the materials removed for re-use. When the pile is large enough, remaining brush and wood scrap will be given to a vendor with a mobile grinding operation (See Composting Component for additional details).

Some of the chipped wood waste (the wood that is relatively free of nails and contaminants) will be used as a ground cover as a part of the Wood and Green Waste Chipping program (see selected programs in the Composting Component - Section 6). The remaining chipped wood waste will most likely be sold (or given away) for use as a fuel in a cogeneration facility or industrial process.

Effectiveness

This program currently diverts approximately 561 tons of wood waste from landfill disposal per year. This represents 3.1 percent of the total waste generated. This program is expected to continue to divert material at this rate throughout the short-term and medium-term planning periods.

Hazards

This program does not pose any significant environmental or safety hazards.

Ability to Accommodate Change

This program should accommodate changes, such as quantities of material received (different than what is expected), economic issues, market conditions, etc., since the material is stockpiled at the landfill and will periodically be chipped and removed from the landfill to be used as fuel by a cogeneration facility or industrial process.

Consequences on Waste Stream

Removing the wood waste from the disposed waste stream reduces the total amount of waste disposed in the UCD landfill. No consequences other than reduced volume and weight are anticipated.

Ability to be Implemented

This program is already in operation. Continuation of the program poses no implementation problems.

Need for Facilities

This program is conducted at the landfill and requires no facilities. The material brought into the landfill by Physical Plant staff and is stockpiled in a designated area. Periodically, the material will be chipped and removed form the landfill for use as a fuel by a cogeneration facility or industrial process.

Consistency with Local Policies and plans

This program does not conflict with any Federal, State, County, CIWMB, or UCD policies, procedures or plans.

Institutional Barriers to Implementation

This program is already in operation. Continuation of the program poses no problems.

Costs

Costs for this program involve the collection process performed by Physical Plant staff. These costs include labor and equipment and amount to approximately $4,860 annually. In addition, the chipping operation will most likely be performed on a contract basis with a private contractor. At present, the chipping service will cost approximately $45 per ton. However, if the chipped wood material is given to the contractor, it may be possible to have the service performed free of charge (although not with terms in existing contract).

Market Availability

All wood collected will be chipped and used for ground cover on campus (see Composting Component) or will be sold or given away for use as a fuel in a local area cogeneration facility or industrial process.

Alternative #4

Continue to salvage tires at landfill

As described in Section 7.2.2, tires are not allowed to enter the UCD landfill for disposal. However, occasionally tires are found in the disposed waste stream at the working face of the landfill. These tires are pulled from the waste and stored in a separate area at the landfill until a sufficient number has accumulated to justify delivery to a Sacramento firm.

This alternative program involves the continuation of the current program, with no substantive changes. No evaluation of this program has been performed, since it is not optional. Tires must not be placed in the landfill for disposal.

Alternative #5

Continue source separation, special collection, and processing of manure

Selection and implementation of this program is described in the Composting Component, Section 6.

Alternative #6
Alternative Uses for Sewage Sludge

As described in Section 7.2.1, UCD will resume disposal of dried sewage sludge in its landfill in 1992. Several alternatives to landfill disposal exist. These alternatives include:

- Land application of sewage sludge
- Co-composting of sewage sludge
- Incineration of sewage sludge
- Use of sludge as landfill daily cover

This alternative has not been evaluated pending the outcome of the Environmental Protection Agency's proposed standards for the final use and disposal of sewage sludge (40 CFR Part 503 - scheduled for promulgation sometime in 1992). Once these standards have been established, this alternative will be fully evaluated in an update to this SRRE.

7.4 SELECTION OF SPECIAL WASTE PROGRAM ALTERNATIVES

Based upon the evaluation of the six special waste program alternatives presented in Section 7.3, UCD has selected the following for implementation:

Alternative #1:	Continue use of asphalt and concrete as roadbed material.
Alternative #2:	Continue source separation and special collection of scrap metals.
Alternative #3:	Continue source separation, special collection, and processing of wood waste.
Alternative #4:	Continue to salvage tires at landfill.

7.4.1 Description of Selected Special Waste Program Alternatives

Provided below is a brief description of each selected special waste program alternative.

Alternative #1: Continue use of asphalt and concrete as roadbed material
As described in Section 7.2.5, concrete and asphalt are regularly generated wastes by private contractors and Physical plant crews as they repair roads and engage in construction and demolition projects. This type of material is brought to the landfill separate from other types of waste and is stored in a designated area. Once at the landfill, the materials is crushed by driving over it with heavy loading and grading equipment. Crushed material that is less than 6 inches in diameter is then used as a roadbase and for a winter dumping pad at the landfill. None of the concrete or asphalt (except that containing rebar or steel) is disposed of in the active area of the landfill.

This alternative program involves the continuation of the current program, with no substantive changes.

Alternative #2: Continue source separation and special collection of scrap metals/white goods
As described in Section 7.2.3, Physical Plant provides an on-call collection service to the entire campus to collect large metal waste types. Typically, this includes metal furniture and equipment that can't be sold by the UCD Bargain Barn, (piping, fencing, etc.). The material is brought to the landfill and stockpiled in large roll-off type debris boxes and is then periodically collected as scrap metal by a salvage company in the Sacramento area.

This alternative program involves the continuation of the current program, with no substantive changes.

Alternative #3: Continue source separation, special collection, and processing of wood waste
As described in Section 7.2.4., in September, 1982, the Yolo County Health Services Agency approved a plan to recycle pallets and wood scrap at the campus landfill. In 1990, 523 tons of materials were diverted to the wood diversion area (demolition debris, stumps, etc.). The public is welcome to remove pallets, logs and scrap. With the installation of a computerized landfill scale, it is possible to weigh the materials removed for re-use. When the pile is large enough, remaining brush and wood scrap will be given to a vendor with a mobile grinding operation (See Composting Component for additional details).

Some of the chipped wood waste (the wood that is relatively free of nails and contaminants) will be used as a ground cover as a part of the Wood and Green Waste Chipping program (see selected programs in the Composting Component - Section 6). The remaining chipped wood waste will most likely be sold (or given away) for use as a fuel in a cogeneration facility or industrial process.

Alternative #4: Continue to salvage tires at landfill
As described in Section 7.2.2, tires are not allowed to enter the UCD landfill for disposal. However, occasionally tires are found in the disposed waste stream at the working face of the landfill. These tires are pulled from the waste and stored in a separate area at the landfill until a sufficient number has accumulated to justify delivery to a Sacramento firm which uses the tires as fuel.

This alternative program involves the continuation of the current program, with no substantive changes. No evaluation of this program has been performed since it is not optional.

7.4.2 Reasons for Selecting Special Waste Program Alternatives

Presented below in Table 7-5 are the reasons UCD has selected (and not selected) the special waste program alternatives for implementation.

Table 7-5. Reasons for Selecting Special Waste Programs

Program Alternative	Selected	Reasons
Alternative #1: Continue use of asphalt and concrete as roadbed material	Yes	* Diverts large amount of material * Very inexpensive to operate program * Program already in operation
Alternative #2: Continue source separation and special collection of scrap metals/white goods	Yes	*Effectively diverts most ferrous metal wastes * Inexpensive to operate program * Program already in operation
Alternative #3: Continue source separation, special collection, and processing of wood waste	Yes	* Effectively diverts most wood waste * Inexpensive to operate program * Program already in operation
Alternative #4: Continue to salvage tires at landfill	Yes	* Tires not allowed to be disposed in landfill
Alternative #5: Continue source separation, special collection, and processing of manure	Yes	* See Composting Component (Section 6)
Alternative #6: Alternative Uses for Sewage Sludge	No	* Pending the outcome of the Environmental Protection Agency's proposed standards for the final use and disposal of sewage sludge (40 CFR Part 503 - scheduled for promulgation sometime in 1992). Once these standards have been established, this alternative will be fully re-evaluated

7.4.3 Diversion Anticipated from Selected Special Waste Program Alternatives

Shown below in Table 7-6 is the anticipated diversion from the selected special waste program alternatives in 1992. These quantities are expected to increase in proportion to increases in UCD's total waste generation. Thus, the diversion rate associated with these efforts is expected to remain constant throughout the short-term and medium-term planning periods.

Table 7-6. Diversion Anticipated from Selected Special Waste Program Alternatives

Program Alternative	Estimated Amount Diverted (tons per year)	Diversion Rate (as percentage of total waste stream)
Alternative #1: Continue use of asphalt and concrete as road bed material Targeted Material: **Asphalt and Concrete**	3,128	17.5%
Alternative #2: Continue source separation and special collection of scrap metals/white goods Targeted Material: **Scrap Metal**	232	1.3%
Alternative #3: Continue source separation, special collection, and processing of wood waste Targeted Material: **Wood Waste**	250	1.4%
Alternative #4: Continue to salvage tires at landfill	<0.1	<0.1%
Total	3,610	20.2%

7.5 IMPLEMENTATION OF SELECTED SPECIAL WASTE PROGRAM ALTERNATIVES

The selected special waste program alternatives are already in operation. Therefore implementation of these programs, for purposes of this SRRE, will involve Physical Plant Staff continuing the operation of these programs in their current form.

SECTION 8

EDUCATION AND PUBLIC INFORMATION COMPONENT

The Education and Public Information (EPI) Component is an integral part of the four main SRRE components (source reduction, recycling, composting, and special wastes). Public education is one of several very important means to accomplishing the specific objectives outlined in each of those components.

This EPI component compiles the individual education programs from the four main components. This component highlights the breadth and scope of activities needed to support the campus waste reduction programs.

To comply with AB 939's ambitious waste reduction goals, UC Davis will need to develop and nurture an effective and ongoing education and public information campaign for students, staff, faculty and administration in the campus community. The EPI component addresses strategies and activities to promote campus community participation in campus waste diversion programs. For a successful program, the campus needs to promote changes in behavior among all community members by regularly reinforcing waste diversion concepts. The program's emphasis centers on education rather than training.

8.1 GOALS AND OBJECTIVES

The general objectives of the EPI component are to increase awareness of, and participation in, the programs described in the previous component sections, as well as to heighten awareness of solid waste disposal issues. More specifically, this includes promoting the concepts and programs of source reduction; giving a higher profile to both the existing and proposed recycling programs; promoting composting; and promoting the overall safe handling and disposal of solid waste on campus. In addition, this component identifies existing academic programs offered by UC Davis that support the public education goals identified for state college systems.

8.1.1 Short Term

- Consolidate current information on recycling commodities emphasizing target commodities in areas identified in the waste generation study.
- Develop new information specifically for the campus community on source reduction, recycling, composting and waste management in general.
- Establish a committee/work-group/task force of individuals already involved in waste management, recycling, and purchasing plus interested staff volunteers, who would support the campus programs by generating new ideas for the campus education program on recycling.
- Promote campus awareness of source reduction, recycling, composting, hazardous waste and other environmental issues.

- Establish a student internship position for students interested in environmental issues with special emphasis on waste management, recycling, composting, hazardous waste or special waste. The internship program would focus on research, training or public education (outreach) in these areas.

8.1.2 Medium-term:

- Expand internship opportunities.
- Evaluate success or failures of short-term goals and implement necessary changes.

8.2 EXISTING CONDITIONS

A variety of public information efforts and academic education opportunities exist on the campus. The campus has used print media, word of mouth and public events to foster waste awareness among the community.

8.2.1 Information Programs

Campus Policy and Procedures Manual
The official policy and procedure manual includes sections describing solid waste collection, diversion and disposal programs. Separate sections address non-hazardous solid wastes, as well as chemical, radioactive and other hazardous wastes generated on a major research and instructional campus.

Safety Nets
The Office of Environmental Health and Safety (EH&S) researches, prepares, updates and publishes over 70 topic-specific, practical one page flyers discussing guidelines and safe procedures on a variety of work place topics. Ten *Safety Net* titles targeting campus staff workers and students address safe handling of campus wastes.

Administrative Directives
Department heads distribute official or critical information about campus issues including waste reduction programs and proper waste disposal practices to campus departments as the need arises.

Bargain Barn Newsletter
This monthly newsletter distributed to all campus departments as well as an extensive off-campus mailing list identifies and encourages the purchase of repairable and reusable products.

Central Stores Receiving Flyer
A quarterly information flyer distributed to all departments on the Central Stores Receiving letterhead updates information on source reduction programs available to the campus community and identifies items available for purchase through Central Stores that are recyclable or made from recycled materials.

Residence Hall and Student Family Housing Newsletters
The periodic mailings such as *The Park Messenger* include information on recycling, source separation and safe handling of solid wastes as needed to keep the campus residential communities informed.

Departmental Newsletters
Several departments take the initiative to publish internal newsletters about departmental or work group recycling opportunities. The Purchasing Department publishes the *Materiel Management Newsletter* twice per year.

California Aggie
The almost daily student run campus newspaper includes a weekly tally of materials recycled and periodic information articles about recycling activities.

Dateline
The weekly publication distributed to all campus staff, administration and faculty periodically publishes information about source reduction, composting, recycling and safe and proper disposal of solid wastes.

Call In
The Physical Plant Solid Waste section and Associated Students Project Recycle receive inquiries from the campus public about recycling issues. Staff is available to take calls and direct callers to the campus compost supply and drop-off locations and provide information about other programs. A dedicated recycle and salvage phone message line has a separate listing in the campus phone directory and takes messages 24 hours a day.

Individual Consultation
As part of a waste exclusion program, collection crews make an effort to advise persons responsible for generators placing inappropriate materials in solid waste collection bins or in recycling carts or bins. Whenever possible, the responsible person is shown the materials or given pictures to use in educating residents or building occupants. The Office of Environmental Health and Safety takes an assertive role in individual consultation when hazardous materials are inappropriately placed in bins and carts.

Signs and Graphics
Signs on every outside trash storage bin and at the campus landfill gates identify wastes allowed and excluded. Many indoor and all outdoor recycling bins are identified with graphics, signs and phone numbers to guide the campus community. A new logo that included the word "recycle" in ten of the languages used in this diverse campus community was developed by the campus recycling committee and Repro Graphics artists.

Public Events
Student events such as Picnic Day and the Whole Earth Festival include student run waste collection and recycling work groups in their event planning and implementation.

Campus Recycle Committee
While this group was not established to focus on education and information, it has been a rich source of information, trends, ideas and discussion. The 25 persons attending

meetings or receiving printed minutes shared much information with each other and other members of the campus and wider community.

8.2.2 Academic Education Programs

A substantial program of formal academic education exists within a variety of departments, which addresses all issues concerning the environment, including waste management, composting, toxic substances, community planning and analysis and more. Courses emphasize the impact of human interaction with the environment and challenge the student to consider the ramifications of our behavior at the community, state, national and international levels.

Academic course work is available to undergraduate and graduate students in various departments. University Extension courses are provided to individuals who already work in some facet of waste management or related areas. Course work currently available is found in the following departments:

Academic Departments

Agronomy
Earth Sciences and Resources (an interdisciplinary Graduate Group)
Ecology
Economy
Engineering
Environmental Biology and Management
Environmental Policy Analysis and Planning
Environmental Studies
Environmental Toxicology
Landscape Architecture
Law, School of
Management, School of
Physics
Political Science
Resource Sciences
Sociology
Water Science

University Extension

Certificate Programs in:

- Integrated Waste Management
- Environmental Hazard Management
- Land Use and Environmental Planning
- Hazardous Materials Management
- Work place Health and Safety

A complete list of academic course titles and descriptions of the certificate programs can be found in a general appendix at the end of this document. Subject matter within each course related to source reduction, composting, recycling and waste handling varies with the course content.

8.3 EDUCATION AND INFORMATION PROGRAM ALTERNATIVES

The waste generation study is useful in identifying target materials and waste streams for focused educational efforts. The study indicates recycling opportunities for the residential, kitchen, institutional and agricultural waste streams.

- The residential waste stream contained large amounts of corrugated and mixed papers.

- The kitchens disposed of large amounts of corrugated material and grass and leaves. The latter is not from the kitchens, directly, but reflects shared trash collection bins and an opportunity for expansion of a wood mulch recycling program.

- Institutional areas disposed of large quantities of corrugate, high grade paper, ag crop residues and medical wastes.

- The agricultural waste stream produced large amounts of ag crop residue and medical waste. The medical wastes identified in the generation study present imperatives and opportunities for education about appropriate disposal as well as proper identification of carnivorous animal food wastes.

8.3.1 Short-term

Newsletters, Mailings, Handouts

Encourage the many newsletters and flyers to continue. Distribute source reduction, recycling, composting and safe handling and disposal information to departments in a one time or annual mailing. Distribute general motivational and informational flyers, banners, notices in Memorial Union, residence halls and class rooms.

Other promotional avenues could include buttons, tee shirts, key chains and announcements on pay stubs.

Local Media Participation

Continue the print media programs in place. In addition to the regular offerings in *The Aggie,* schedule regular exposure in *Dateline.*

Networking

Continue the recycle committee composed of representatives of selected student, staff, administrative and faculty groups which would make recommendations to the groups responsible for campus waste reduction programs.

Establish a network of departmental or work group representatives, similar to the campus energy network, who could be contacted to distribute information about new programs or changes in existing programs. They would contact the recycle committee with problems and ideas. Some might be recycle committee members.

Research and develop on-campus and off-campus resources such as Bargain Barn and CAL NET, a state sponsored materials clearing house, to assist campus source reduction efforts.

In-Service Education, Consumer Information

Utilize Experimental College to generate interest in promoting awareness of or providing hands-on experience in composting and recycling. All related issues such as source reduction could be incorporated into the curriculum.

Offer services to targeted waste stream generators to assist generators to identify effective ways to divert targeted recyclables. Work with them to develop a workable program.

Prepare announcements for the campus radio station.

Honor and Award System
Develop a means of recognizing successful program participants in the print media.

Speakers Bureau
Establish a resource of persons knowledgeable about and willing to make presentations about waste reduction, composting, recycling and waste handling issues.

8.3.2 Medium-term

In-Service Education, Consumer Information
Develop classes to educate departments on the need for and benefits of source reduction, recycling, proper waste handling. Provide information to new hires at the orientation class and to students at quarterly residence hall gatherings. Include written information in orientation information packets. Other staff development opportunities could include workshops and field trips.

Internship Program
Expand, develop and coordinate an internship program Although most departments offer internship opportunities, waste reduction programs could play a role in promoting the expansion of existing programs or creating new opportunities. These opportunities would be related to some aspect of waste management; household hazardous waste handling, composting, recycling, source reduction or special waste. The general thrust of each internship would concentrate on environmental issues through research, education or training and would emphasize:

- Policy analysis,
- Community and environmental planning,
- Recommendations for policy development,
- Field projects which are scientific in nature, and
- Current issues in the waste management profession.

8.4 PROGRAM IMPLEMENTATION

8.4.1 Organizations Responsible for Implementation

University Staff
Central Stores Receiving staff will continue to provide information about recyclable products, products made from recycled materials and source reduction programs

available to the campus community. They will participate in developing and presenting source reduction information as part of student, staff and faculty orientation programs and ongoing information update programs.

Physical Plant Solid Waste staff will serve as a recycling and composting information clearing house. As a major collector and hauler of non-hazardous solid waste and recyclable materials and as operator of the composting, wood and metal diversion programs and waste exclusion load checking programs, Physical Plant will be aware of changing markets, program needs and quantities diverted. Staff will continue education programs in place.

Office of Environmental Health and Safety (EH&S) staff will continue and expand education efforts concerning appropriate disposal practices for hazardous materials.

Staff persons from various departments either significantly involved in or affected by source reduction, recycling, composting and safe waste handling (i.e. Central Stores Receiving, Purchasing, Repro Graphics, Food Service, Physical Plant, EH&S) or representing departments conducting waste diversion programs would participate in the campus recycling committee.

All departments or work groups would identify an information network liaison to receive information about program updates and to pass on ideas and questions to the campus recycling committee.

Student Groups

Associated students, student sousing and student family housing groups and staff will use information provided by university staff to prepare and disseminate information about source reduction, recycling, composting and safe solid waste handling practices. Each group will focus information on the needs of the particular group.

Student groups and staff would identify persons to participate in the campus recycling committee and to participate in the information network.

When a student intern program is more fully developed and implemented, student participants will have the opportunity to research, analyze, plan, implement, evaluate and document programs of interest in topics as diverse as public information, class room education (i.e. Experimental College and Staff Development), policy development and analysis, planning and program development.

Academic Departments

Changes in and additions to General Catalog course offerings and degree programs are proposed and developed by the academic department desiring to make the change. The Academic Senate, a separate decision making body, makes decisions about curriculum changes requested by academic departments. The Planning and Budget Department determines funding and staffing for curriculum changes recommended by the Academic Senate. Once funded, the academic group would identify faculty to develop and teach the new courses. Funding is needed to institute permanent positions. With the exception of some forms of composting, no research money exists for this area at this time.

Academic departments can identify sponsors for internships for credit and personnel to participate in the campus recycling committee.

8.4.2 Required Implementation Tasks

Implementation tasks include:

- Identifying priorities and schedules for program expansions,
- Updating and compiling waste generation study information to select materials and targeted waste streams,
- Establish workable means to get waste diversion data,
- Identifying liaisons with the information network, and
- Developing and implementing additional public information programs.

8.4.3 Implementation Schedule

Short-Term
Focus on public information about waste reduction programs currently in place. Emphasize increasing awareness of waste reduction needs and current methods available to the campus community. Continue information and academic education programs currently in place. Establish the information network. Develop and present information about source reduction, recycling, composting and safe handling of solid waste at student, staff and faculty orientations.

Medium-Term
Develop and distribute information about expanded waste reduction opportunities. Academic departments may consider adding one or more positions with an emphasis in solid waste management.

8.4.4 Program Costs

Table 8-1 summarizes ongoing costs for education and public information programs. Revenues and revenue sources for program implementation are discussed in Section 10, Funding Component.

Administrative directives, policy manual updates and official publications such as EH&S *Safety Nets* can be published on regular schedules and distributed as deemed necessary by persons responsible for campus programs. Administrative directives would be published three times annually, at the beginning of each quarter. *Safety Nets* are revised every two to three years.

Advertising would appear quarterly in *The Aggie*.

With the exception of the *Bargain Barn Newsletter*, published regularly and dedicated to source reduction and reuse, campus newsletters are published as prepared and generally devote only a portion of copy space to waste diversion and handling issues.

Public contact programs such as call-in consultation or informal presentations would continue to be incorporated into the regular work activities of university staff and do not have identified costs. Two planned public events per year could include participation in student run events or scheduling a public forum.

Table 8-1. Funding Requirements for Education and Public Information Component

Program	Current Expense Annual	Short-Term Expense Annual
Directives Waste Handling, Recycling, Source Reduction	$800	$800
Newsletters Source Reduction Recycling and Waste Handling	$2,500	$2,500
Paid Advertising Waste Handling, Recycling, Source Reduction	$600	$600
Signs and Graphics Waste Handling, Recycling	$500	$500
Speakers Source Reduction, Waste Handling, Recycling		$700

Note: Short-Term expenses do not include inflation.

8.5 MONITORING AND EVALUATION

This section describes the methods to monitor the success of UC Davis' public information programs, the evaluation criteria for determining program effectiveness, the parties responsible for program monitoring and evaluation, the funding requirements, and the contingency measures to be implemented if is determined that the public information program is not achieving its goals. The monitoring program will be performed periodically and a report summarizing the progress toward the stated objectives will be prepared. ACR 149 requests the university to present a report to the Legislature annually by September 1.

8.5.1 Methods to Quantify and Monitor Achievement of the Public Information Program

The objectives are to maximize awareness of the programs described in the source reduction, composting, recycling and special waste components to all members of the campus community, as well as to heighten awareness of solid waste disposal issues.

In order to establish a baseline for monitoring the effectiveness of public information efforts, a survey is planned for 1992. The survey will be used to understand the current level of awareness of programs available to each member of the campus community. The survey will be an indicator of the effectiveness of public information techniques (i.e., which techniques were effective, which were not; how people are actually learning about a given program). The survey is planned to be readministered at periodic intervals to assess the changes in the level of knowledge about campus activities and waste management activities in general.

8.5.2 Criteria for Evaluating Program Effectiveness

UC Davis plans to evaluate the effectiveness of the public information program by applying the following criteria to each activity:

- Were all waste generators aware of the source reduction, recycling and composting programs available to them? The existing level of public awareness will be determined by the survey planned for 1992 and each successive period.

- Did the responsible entities execute the tasks required? The responsible entities include student, staff and faculty groups.

- Were the tasks implemented on schedule? The timing is described in Section 8.4.3.

8.5.3 Parties Responsible for Program Monitoring, Evaluation and Reporting

The survey and program evaluation will be performed by the Physical Plant department with assistance from the campus recycling committee. Several departments, including Physical Plant, Purchasing and EH&S, are either required or requested to provide the Legislature with annual written reports of waste reduction activities. The survey will establish a baseline for the level of public awareness from which to gauge the effectiveness of the EPI component.

8.5.4 Funding Requirements

The funding requirements for the monitoring and evaluation program include staff time to conduct and respond to the survey, to review date and determine program effectiveness, and to prepare a written report summarizing the progress towards meeting objectives. The expected cost for these activities is approximately $5,100 per year.

8.5.5 Contingency Measures

Contingency measures will be implemented if the monitoring criteria identified in Section 8.5.2 shows information objectives are not being met.

1. If anticipated levels of public awareness are not met, the University will consider implementing the following:

- Using information generated by the periodic survey, increase the level of effort for specific identified shortcomings;
- Reviewing effectiveness of the selected public information techniques; and
- Revising and expanding public information efforts.

2. If the required tasks are not executed by the responsible entity, the University will consider implementing the following:

- Reevaluating staff adequacy.

3. If tasks are not implemented according to schedule, the University will consider implementing the following:

- Reevaluating staff adequacy,
- Revising and expanding schedules to reflect changing needs identified by the periodic survey.

SECTION 9

DISPOSAL FACILITY CAPACITY COMPONENT

The purpose of the Disposal Facility Capacity Component is to review the disposal capacity available to the University of California, Davis, at its permitted solid waste disposal facility. The goal is to ensure that adequate landfill capacity is allocated for disposing of solid waste that cannot be diverted through source reduction, recycling, or composting activities. Nonrecyclable wastes, residue from materials recovery operations, and nonprocessible materials and residue from incineration/transformation operations are wastes that will not be diverted from the landfills. A projection of solid waste disposal facility needs has been calculated by estimating the disposal capacity required to accommodate the total solid waste that will be generated by the university over the next 15 year period. As defined in Section 18744 of AB 939 (Sher, Chapter 9/90), the 15 year period begins in 1991 and extends through 2005.

As specified in Section 18744 of AB 939, the facility capacity component should include a description of existing permitted solid waste landfills and transformation facilities located within the jurisdiction of the university and a projection of the university's solid waste disposal facility needs. The discussion should also cover solid waste facilities that are to be phased out or closed, expanded, or that are newly established, and plans to import or export wastes to or from the university.

9.1 EXISTING DISPOSAL FACILITIES

The University of California, Davis, currently owns and operates a landfill (known as the UC Davis Landfill), providing landfill capacity to the university and its functions only. Information on the UC Davis Landfill, including facility location, owner, operator, permitted site acreage, permitted capacity, and remaining facility capacity are summarized in Table 9-1.

Table 9-1. UC Davis Owned and Permitted Disposal Facilities Located on Campus

Facility Information	UC Davis Landfill
Location	West side of County Road 98 (Pedrick Road) south of Hutchinson Drive north of Putah Creek
Owner	University of California
Operator	University of California, Davis, Physical Plant
Landfill classification	Class III
Annual quantity of waste disposed for the year 1991	17,922 tons per year
Types of waste	Nonhazardous university solid waste including wastes from residential living units, university buildings, on campus kitchens, and from selected agricultural facilities
Overall permitted site acreage	23.44 acres (Extension 15.35 acres)
Permitted daily capacity	800 t/d
Remaining permitted facility capacity	158,667 yd^3; 7 years based on 10,200 t/y and 900 lb/yd^3
Capacity in extension site (Submitted to CIWMB for approval)	599,757 yd^3; 41 years based on 6,500 t/y and 900 lb/yd^3
Disposal fees	None
Area served	University of California, Davis, campus.

9.2 FUTURE DISPOSAL CAPACITY NEEDS

Future disposal capacity requirements through the year 2005 have been estimated and are reported in Table 9-2. The disposal needs projection anticipates future solid waste generation at the UC Davis, over the next 15 years. The needs projection is calculated using certain reasonable assumptions about waste management practices and trends over the next 15 years. It should be noted that the actual capacity needs may vary if the underlying assumptions do not hold true over the 15 year period. The projection of disposal capacity needs will require periodic revision to reflect future diversion rates and the evolving solid waste management system.

9.2.1 Determining Disposal Capacity Needs

The projection of disposal capacity needs for the next 15 years (see Table 9-2) is based on the solid waste generation projection conducted in accordance with the Solid Waste Generation Study (SWGS), as set forth in Section 18722, Article 6.1. The disposal capacity needs projection is calculated using the additional capacity equation as defined in Section 18744, Article 6.2 and given below.

Capacity Needs Equation

For the year n:

$$\text{ADDITIONAL CAPACITY}_{\text{Year n}} = [(G + I) - (D + TC + LF + E)]$$

Definition of Terms

G = The amount of solid waste that is projected to be generated by the University of California, Davis
I = The amount of solid waste that is expected to be imported and disposed of in the permitted landfill
D = The amount of waste diverted through successful implementation of proposed source reduction, recycling, and composting programs
TC = The amount of volume reduction occurring through available, permitted transformation facilities
LF = The amount of permitted solid waste disposal capacity which is available for disposal in the jurisdiction, of solid waste generated in the jurisdiction
E = The amount of solid waste generated in the jurisdiction which is exported to solid waste facilities through interjurisdictional agreements(s) with other cities or counties, or through agreements with solid waste enterprises, as defined in Section 40193 of Public Resources Code
n = Each year of a 15 year period commencing in 1991

9.2.2 Projecting Disposal Capacity Needs

Results from the disposal capacity needs projection are shown in Table 9.2 The capacity needs are shown for 1991 through 2005, and impacts of expanded facilities have been accounted for in the projection. All solid waste values are expressed in tons per year (t/y). To determine the corresponding volume, an average compacted density of 900 pounds per cubic yard was used. The disposal capacity calculations indicate that the existing disposal site has a useful life of about 7 years.

Solid Waste Generated

The amount of solid waste generated (G) for each year in the planning period was obtained from the Solid Waste Generation Study (SWGS) prepared by EBA Wastechnologies (1991). Population projections were applied to the 1990 waste generation rate to estimate the future waste generation through the year 2005. The waste tonnages projected in the SWGS were converted to cubic yards by a conversion factor of 900 pounds per cubic yard.

Solid Waste Imported

The total amount of solid waste imported (I) into the UC Davis Landfill is assumed to be zero as the landfill is only used to serve the campus community.

Solid Waste Diverted

The amount of solid waste diverted (D) through successful implementation of proposed source reduction, recycling, and composting programs is obtained from the Waste Diversion Model in the Integration Component. The Waste Diversion Model provides the projected tonnages of waste diverted for 1991 through 2000. For the years 2001 through

2005, the diversion rate (as a percent of the total waste generated) projected for the year 2000 was assumed to remain constant.

Transformation Facility Reduction

The amount of permitted transformation facility reduction (TC) was assumed to be zero.

Permitted Disposal Capacity

The permitted disposal capacity (LF) available for the unincorporated areas of Yolo County is is assumed to be zero as the landfill is only used to serve the campus community

Solid Waste Exported

The exported waste (E) was assumed to be zero. In the future, the university may decide to export its wastes to the Yolo County Central Landfill.

Table 9-2. Additional Capacity Requirements for UC Davis

Year	G (t/y)	I (t/y)	D (%)	D (t/y)	TC (t/y)	LF (t/y)	E (t/y)	AC (t/y)
11,052 1991	17,922	0	38.2	6,870	0	0	0	11,047
11,303 1992	18,590	0	39.2	7,287	0	0	0	11,303
11,277 1993	18,547	0	39.2	7,270	0	0	0	11,276
11,469 1994	18,863	0	39.2	7,394	0	0	0	11,469
11,606 1995	19,089	0	39.2	7,483	0	0	0	11,606
7,553 1996	19,318	0	60.9	11,765	0	0	0	7,553
6,727 1997	19,530	0	63.0	12,803	0	0	0	7,226
6,891 1998	19,745	0	65.1	12,854	0	0	0	6,891
6,548 1999	19,963	0	67.2	13,415	0	0	0	6,548
6,216 2000	20,182	0	69.2	13,966	0	0	0	6,216
6,284 2001	20,404	0	69.2	14,120	0	0	0	6,284
6353 2002	20628	0	69.2	14,275	0	0	0	6,353
6423 2003	20,855	0	69.2	14,432	0	0	0	6,423
6494 2004	21,085	0	69.2	14,591	0	0	0	6,494
6334 2005	21,317	0	69.2	14,751	0	0	0	6,566

9.3 DISPOSAL FACILITY CLOSURES

The existing permitted area at the UC Davis Landfill is anticipated to remain active and operating for a period of at least 7 years, at which time it would be closed.

9.4 NEW OR EXPANDED DISPOSAL FACILITIES

UC Davis has submitted an application to the CIWMB to expand its existing landfill. The landfill extension would have a useful life of about 41 years based on an annual tonnage of 6,500 tpy with a compacted density in the landfill of 900 lb/yd^3 using the waste projections given in Table 9-2.

9.5 PLANS TO EXPORT WASTE TO ANOTHER JURISDICTION

At the present time the UC Davis has no plans to export its wastes to another jurisdiction. As noted above, the university may in the future decide to export its wastes to the Yolo County Central Landfill.

SECTION 10

FUNDING COMPONENT

Programs outlined in this Source Reduction and Recycling Element will result in UC Davis achieving its waste diversion goals, as well as managing its waste stream in an environmentally sound manner. Funding for existing programs has already resulted in a diversion rate of 42.5%, well in excess of the short term diversion goals outlined in AB939.

This section provides information on the funding of the various components that make up the UCD Source Reduction and Recycling Program. In particular, this section describes the current mechanisms used to fund solid waste management activities for the campus; provides cost estimates for the planning, development, implementation, and evaluation/monitoring of component programs for the short term; and describes the process by which future funding may be obtained.

10.1 CURRENT FUNDING SOURCES

The total operating budget (excluding contracts, grants, and gifts) for the Davis campus as of 1 July 1991 is $829,144,278, of which 38.4 percent is from the State of California's General Fund. The budget includes funds from fees and service charges generated by the Medical Center, clinical practice plans, and auxiliary enterprises, e.g. parking and student housing. Additional revenue comes from the Federal Government, endowments, extramural contracts, gifts and grants, etc. Student fees provide approximately 8.6 percent of revenues required for the 1991-92 campus budget.

Within the organizational structure of UCD, a number of departments and campus groups are involved in source reduction or recycling programs. Funding sources for these activities are dependent upon the individual organization. Those departments funded directly by the state may utilize a portion of their administrative budgets to operate their respective programs. Auxiliary Enterprises, on the other hand, do not receive state funds and operate on revenue generated by their respective services, i.e. Student Housing. In these cases, waste diversion program costs can be included as part of overhead and are recovered on a recharge basis. Lastly, student run auxiliaries such as Project Recycle, receive funding through the sale of t-shirts and recycled material as well as a subsidy from ASUCD.

A minor portion of source reduction and recycling expenses are offset by revenues generated by recycling. Approximately $33,000 in revenues were received in the 1990-91 fiscal year. A number of factors influence the amount of revenues that can be obtained, not the least of which is a fluctuating market for recyclable materials. As cities and counties increase their recycling activities, increasing supplies of materials will inevitably result in a drop in their value. For this reason, revenues generated through campus diversion programs are not included as a reliable source for program funding.

The majority of funding for the SRRE components is provided by the campus Physical Plant Department. The Solid Waste Collection and Disposal Section of Physical Plant is directly responsible for the collection and disposal of non-hazardous waste as well as for the operation and maintenance of the campus landfill. As part of Physical Plant, the Solid Waste Collection Section receives direct Operation and Maintenance of Plant (OMP) funding, from the State of California, and indirect funding from services provided to self-supporting activities and other entities not eligible for State funding. Indirect support is covered through recharges to campus departmental budgets. The Solid Waste Collection and Disposal operating budget for fiscal year 1991-92 is $812,123, out of which $644,284 is direct funded and $167,839 is recovered through departmental recharges. Approximately $190,000 or 22.6% of the budget is utilized for waste diversion and recycling programs.

10.2 ESTIMATED PROGRAM COSTS

Source Reduction

There are a number of programs and activities in place at UCD that encourage the reduction or reuse of waste materials. Many of these programs represent a normal way of doing business (electronic mail, double sided copying, microfiche service, wood pallet reuse, etc.) and therefore do not represent any additional costs. In many cases, administrative costs are actually reduced via these programs. The bulk of expenditures comprising the source reduction program are represented by the Bargain Barn which operates on an annual budget of approximately $49,000.

Recycling

Currently, a number of independent recycling programs are managed by a variety of UCD departments and campus groups. In most cases, the programs are relatively small in scope and costs are not accounted for. In these cases the associated costs are assumed to be zero. Only the ASUCD and Physical Plant programs involve significant amounts of labor and equipment and therefore comprise the bulk of the expenditures associated with the implementation of this component. Annual expenses are estimated at $90,000 for Physical Plant managed programs, and $22,500 for those programs managed by ASUCD.

Composting

The current manure composting operation managed by Physical Plant costs approximately $25,000 annually. This includes delivery to the site as well as the equipment and labor costs associated with spreading and drying the material.

Education

Costs associated with the public education component stem mainly from publishing expenses associated with flyers, newsletters and campus periodicals. These expenses are likely to be shared by a number of campus departments including Physical Plant, ASUCD, Central Storehouse, and Student Housing. Annual expenses borne by each department vary in amounts ranging from $300 to $2,200 and are considered to be a part of administrative overhead.

As an institution of higher learning, UC Davis already has in place a wide number of academic programs and classes related to studies in waste management, composting,

and environmental planning. These programs not only serve to develop an appreciation for source reduction and recycling within the student population, but also facilitate research on better methods to resolve waste management issues. Costs associated with these programs have not been included as part of the Education component because they represent formal rather than public education and are tied more directly to the academic mission of the university.

Special Waste
Annual expenses associated with the diversion of special wastes are borne by Physical Plant through its salvage operation. Current annual expenditures for this operation which provides an alternative to the disposal of bulky waste, metals and equipment (desks, file cabinets, fencing, pipe, etc.) are $32,000. Physical Plant also stores concrete and asphalt which is crushed and used as a roadbase for the landfill. This results in additional expenses on a biannual basis of approximately $7,200.

Transformation
Physical Plant also manages two programs that, while in the short term do not count as a diversion credit, will count in 1996 when transformation credits are allowed. Wood wastes are collected and accumulated at the landfill until enough is available to make it economically feasible for an external vendor to grind and sell for fuel. This program costs approximately $4,900 per year. Physical Plant also collects dead animals which are brought to the pathological crematory at the waste water treatment facility. Operating costs for this program include $17,400 for collection and $58,200 in fossil fuel and crematory maintenance costs.

Table 10-1 shows the estimated expenditures by UC Davis for its current program. Because UC Davis is currently exceeding the goals set forth in AB939 for 1995, no large scale program expansion is expected to occur in the short term. Costs are therefore expected to remain relatively constant through 1995. A 3% annual inflation factor was applied for purposes of projecting expenses over the short term planning horizon.

10.3 FUTURE FUNDING SOURCES

While UCD is not mandated by State law to comply with the requirements of AB939, it has chosen to demonstrate a commitment to the achievement of the goals outlined within it. As UCD looks to the medium term it will be necessary to expend additional resources in keeping with the spirit of that commitment. The method by which these resources can be obtained is limited to the State budget process. Each year, the University requests additional Operation and Maintenance of Plant (OMP) funding for new Maintained Gross Square Footage (MGSF) that is eligible for State-support. Eligible space is funded by a formula based on MGSF and average annual costs. Extensive documentation and consultation with the University of California Office of the President follows to ensure that the activities conducted in these newly acquired facilities are eligible for State support. Other campus fund sources are used to pay the OMP costs for those facilities not eligible for State support.

For facilities not eligible for State support, i.e. auxiliary services such as residence halls, funding increases would be required. If other general funding sources were not

available for these auxiliaries, increasing rates, i.e. room and board rates, would be examined to fund the increased staff and equipment costs associated with greater waste diversion efforts.

In the past years, through a variety of reporting mechanisms, the Office of the President prepares the OMP funding request for all campuses and includes an average amount for each of eight components, one of which is for refuse operations. While campuses budget using these averages, the uncertainty of the State budget may result in changes to this formula budgeting.

SECTION 11

INTEGRATION COMPONENT

The Integration Component summarizes the Source Reduction and Recycling Element (SRRE) and demonstrates how the waste diversion programs selected in the Source Reduction, Recycling, Composting, and Special Waste Components (contained within this document) will be implemented to exceed the AB 939 goals of 25 percent diversion by 1995 and 50 percent diversion by the year 2000. In addition, this component provides an overall implementation schedule which illustrates when each of the selected diversion programs will be developed and brought into operation.

As documented in the Solid Waste Characterization Component (Section 3), UCD already has in place a number of very effective diversion programs that are diverting 38.2 percent of the total waste generated on campus (7,595 tons per year). Each of these existing programs is described in the "Existing Conditions" subsection of the Source Reduction, Recycling, Composting, and Special Waste Components of this SRRE. Even though the University has far exceeded the AB 939 diversion goals set for 1995, UCD intends to continue to improve upon its current level of waste diversion by enhancing the existing efforts in the short-term planning period (1992-1995) and implementing new programs in the long-term planning period (1996-2000). By the year 2000, UCD expects to be diverting 69 percent of its generated waste away from landfill disposal.

11.1 DIVERSION PROGRAMS SELECTED FOR THE SHORT- AND MEDIUM-TERM PLANNING PERIOD

UCD has carefully evaluated its existing diversion programs, as well as many new program alternatives. From this evaluation, UCD has selected a comprehensive set of waste diversion programs that will effectively divert a large percentage of the University's generated solid waste away from disposal in the UCD landfill. Described below are the programs that have been selected for continued operation and new implementation.

11.1.1 Source Reduction Programs

Provided below is a brief description of the selected source reduction programs. It should be noted that all of the selected source reduction programs will involve the continuation of existing programs. Due to the success of these programs and limited budget, no new program alternatives have been selected for implementation.

11.1.1.1 Bargain Barn

The Bargain Barn is located on campus at the Central Stores/Receiving Department and specializes in the sale of excess, surplus and used UCD property. This includes office equipment, furniture, computer equipment, laboratory equipment, and other miscellaneous equipment and supplies. Material sold through the Bargain Barn is UCD property that is no longer needed by an individual UCD department. Property sales are initially limited to other UCD departments for 30 days. After that time, they become available to the general public to purchase. This program is expected to continue operation through the short-term and medium-term planning periods with not substantive changes.

11.1.1.2 Computing Service E-Mail System

Computing Services provides electronic mail service to UCD departments. This system significantly reduces the amount of paper utilized for inter-campus correspondence (as well as telephone calls). This system is expected to continue in operation through the short-term and medium-term planning periods with no substantive changes.

11.1.1.3 Inter-Departmental Programs

(1) **Project TREE Telecommunication**
Project Tree is a telecommunications program which encourages precycling of paper products, double-sided copying, electronic mail, and the re-use of paper as scratch paper. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

(2) **VMTH Publication List Distribution**
VMTH periodically sends out a list of publications, thereby eliminating the need for producing individual memos on office paper. This program is expected to continue operation through the short-term and medium-term planning periods with no substantive changes.

11.1.1.4 Food Service Programs

Food Service and the Coffee House promote the re-use of beverage cups by offering a ten cent discount to customer who bring their own refillable cup (which is purchased at the Coffee House). The Coffee House sold approximately 5,000 refillable cups in 1991. Assuming each was used three (3) times (2 refills), 10,000 disposable cups were not used. This program is expected to continue operation through the short-term and medium-term planning periods with not substantive changes.

11.1.1.5 ReproGraphics - Doublesided Copiers

ReproGraphics has purchased double sided copiers to encourage double-sided copying. At present, approximately 50 percent of the copy machines provided by ReproGraphics to UCD departments have double-sided copying capabilities. this number is expected to increase as new copiers are purchased to replace older machines.

11.1.1.6 Central Stores/Receiving Reuse Program

Central Stores/Receiving reuses cardboard boxes, wood pallets, and polystyrene packing peanuts, and collects for reissue to UCD departments used inter-campus envelopes. In addition, Central Stores/Receiving supplies refilled laser toner cartridges for campus use. Also, Central Stores/Receiving stocks and issues products made of postconsumer waste, such as toilet tissue, reclaimed rubber door mates, copy paper, computer paper, and white mailing envelopes. The use of these items is promoted using fliers, in-person advocacy, and the Storehouse Catalog. These efforts are expected to continue through the short-term and medium-term planning periods with no substantive changes.

11.1.1.7 Quick Copy Doublesided Copying Service

Quick Copy now offers double-sided copying service to UCD departments. Since ReproGraphics instituted this service, 65 - 75 percent of all copying is double-sided. These efforts are expected to continue through the short-term and medium-term planning periods with a gradual increase in the percentage of copying that is done double-sided.

11.1.1.8 ReproGraphics Microfiche Service

ReproGraphics provides a microfiche service to eliminate the need to print large reports in hard copy on computer paper. this service is estimated to reduce the amount of computer paper waste by 55.5 million sheets per year. this represents approximately 300 tons of computer paper per year. this effort is expected to continue through the short-term and medium-term planning periods with no substantive changes.

11.1.2 Recycling Programs

Based upon the evaluation of the four recycling program alternatives presented in Section 5.4, UCD has selected **Alternative #2 ("Creation of Centrally Coordinated Campus-Wide Recycling Program")** for implementation.

Description of Selected Recycling Program

Presently, ASUCD Project Recycle and Physical Plant perform the majority of the recycling collection services that occur on campus. ASUCD in particular has developed a campus-wide source separated bin collection program for office paper, aluminum and glass. As described in Section 5.2, several other departments also have some recycling efforts going on within their offices or buildings, but most of these efforts are provided with collection support from ASUCD and/or Physical Plant staff. This alternative would involve expanding the existing programs campus-wide by adding collection bins and material types to improve participation and increase the quantities of materials collected. In addition, improved educational efforts to accompany the various collection efforts would be developed to increase awareness of the recycling programs and provide an understanding of how the programs work. In particular, areas of the campus currently not receiving recycling service would be identified and targeted for new programs.

To facilitate this alternative, one centralized coordination entity will assume responsibility for the coordination of all recycling programs occurring on campus. This entity will be charged with the task of aggressively seeking methods that will improve the efficiency of the existing programs, as well as develop new programs for areas of the campus that are currently not recycling. This alternative provides for a designated person, organization, or UCD department with overall coordination responsibility for all recycling occurring on campus and to ensure consistency between departmental programs, compliance with fire laws, and fulfillment of reporting requirements to Yolo County and the California Integrated Waste Management Board (CIWMB). As such, this centralized entity will be involved with all equipment, staffing, operations, and capital investment recommendations associated with recycling programs. Most likely there will be other UCD departments, organizations, and associations providing recycling services under the general guidelines and performance specifications established by the central coordinating entity.

In those areas where recycling is already occurring, a review of the existing operating procedures and overall program effectiveness will be conducted to determine how diversion rates can be improved. Problems will be determined, solutions formulated, new equipment or facilities installed and/or procedures implemented (if necessary), and educational programs developed. Responsibility for implementing this alternative would most likely be shared by ASUCD, Physical Plant and some of the other UCD departments and organizations involved with recycling. These new initiatives would be done as the time of available staff and existing budgets permit.

Specific aspects of this program may include:

1) Providing recycling bins to areas of campus currently not serviced;

2) Providing additional recycling bins to selected areas of campus which currently have some service, but could use more;

3) Ensuring that a designated entity is responsible for regularly moving recycled material from recycling bins to the larger collection bins (custodial staff, volunteer, other UCD employee);

4) Developing a system to closely examine each existing recycling program and determine how to improve effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

5) Developing tailored educational programs for each recycling effort to increase effectiveness (i.e. kitchens, student housing, administrative offices, etc.)

6) Coordinating the installation of new facilities, equipment and/or operational procedures in the Coffee House, residence halls, kitchens, administrative offices and other areas where larger scale recycling operations are in place that will improve program effectiveness. This could include items such as individual office mixed paper collection bins, chutes in residence halls for recyclable material, dedicated tools for sizing cardboard in areas where cardboard is generated and recycled, etc.

7) Increasing collection frequency by ASUCD and Physical Plant staff for recycling bins they service to ensure that bins always have available space and are clean.

11.1.3 Composting Programs

Being an agricultural university, UCD produces a number of compostable waste material types in large quantities. The most noteworthy being manure. After careful consideration of the existing composting and green-waste collection and handling operations that divert these material types, and an evaluation of a number of additional collection, processing, and siting alternatives, the following programs were selected for implementation.

11.1.3.1 Expanded Manure Composting Program

Manure currently composted is delivered to the site by Animal Science department workers. In collection alternative 1, Physical Plant solid waste crews now collecting waste for burial will dedicate one route to collecting manure, bedding straw and yard waste for burial with a route dedicated to collecting these materials for composting.

Manure from the animal science department is spread in six inch layers and turned or stirred three times per week or more often if needed to reduce spontaneous combustion dangers and to

control fly breeding. When dry and "cool" the finished product is pushed into the pile and given without charge to the public and campus community members who wish to take it on a load your own basis. Two days per week solid waste workers assist with loading using a front loader.

Approximately 16.5 percent of the waste stream is diverted from burial by the present composting program. Additional diversion of manure (up to 28.2 percent of the waste stream) is possible with the selection of the alternative collection methods described above. However, due to the limited processing equipment, only manure, such as that available at the Equestrian Center or Avian Sciences could be added. In order to accommodate all of the additional manure a compost turner would need to be acquired. This is planned in the medium-term planning period.

11.1.3.2 Wood and Green Waste Chipping Program

Wood and green waste is currently being stockpiled in a separate area of the landfill. The potential composting of this material has been addressed. An alternative to composting would be to chip this material and use it as mulch within the University or sell it for transformation.

The waste generation analysis identified 660 tons per year of material that is potentially available for chipping.

A contractor with mobile equipment would chip the material for approximately $35 to $45 ton plus mobilization. This cost could be offset if the material is sold for transformation.

Due to the relatively small amount of material generated, the purchase of equipment at from $75,000 to $150,000 or more is not economical. The 660 tons of material could be processed at a cost of from $23,000 to $30,000 annually.

The University will use the material made available or the material may be given away free (or sold if market conditions allow) or used for landfill cover if it passes state qualification guidelines for a suitable cover material.

11.1.4 Special Waste Programs

Provided below is a brief description of the selected special waste programs. It should be noted that all of the selected special waste programs will involve the continuation of existing programs. Due to the success of these programs and limited budgets, no new program alternatives have been selected for implementation.

11.1.4.1 Continue use of asphalt and concrete as roadbed material

As described in Section 7.2.5, concrete and asphalt are regularly generated wastes by private contractors and Physical plant crews as they repair roads and engage in construction and demolition projects. This type of material is brought to the landfill separate from other types of waste and is stored in a designated area. Once at the landfill, the material is crushed by driving over it with heavy loading and grading equipment. Crushed material that is less than 6 inches in diameter is then used as a roadbase at the landfill. None of the concrete or asphalt (except that containing rebar or steel) is disposed of in the active area of the landfill.

This alternative program involves the continuation of the current program, with no substantive changes.

11.1.4.2 Continue source separation and special collection of scrap metals/white goods

As described in Section 7.2.3, Physical Plant provides an on-call collection service to the entire campus to collect large metal waste types. Typically, this includes metal furniture and equipment that can't be sold or given away by the UCD Bargain Barn, (piping, fencing, etc.). The material is brought to the landfill and stockpiled in large roll-off type debris boxes and is then periodically collected as scrap metal by a salvage company in the Sacramento area.

This alternative program involves the continuation of the current program, with no substantive changes.

11.1.4.3 Continue source separation, special collection, and processing of wood waste

As described in Section 7.2.4., in September, 1982, the Yolo County Health Services Agency approved a plan to recycle pallets and wood scrap at the campus landfill. In 1990, 523 tons of materials were diverted to the wood diversion area (demolition debris, stumps, etc.). The public is welcome to remove pallets, logs and scrap. With the installation of a computerized landfill scale, it is possible to weight the materials removed for re-use. When the pile is large enough, remaining brush and wood scrap will be given to a vendor with a mobile grinding operation (See Composting Component for additional details).

Some of the chipped wood waste (the wood that is relatively free of nails and contaminants) will be used as a ground cover as a part of the Wood and Green Waste Chipping program (see selected programs in the Composting Component - Section 6). The remaining chipped wood waste will be sold or given away for use as a fuel in a cogeneration facility or industrial process.

11.1.4.4 Continue to salvage tires at landfill

As described in Section 7.2.2, tires are not allowed to enter the UCD landfill for disposal. However, occasionally tires are found in the disposed waste stream at the working face of the landfill. These tires are pulled from the waste and stored in a separate area at the landfill until a sufficient number has accumulated to justify delivery to a Sacramento firm which uses the tires as fuel.

This alternative program involves the continuation of the current program, with no substantive changes. No evaluation of this program has been performed since it is not optional.

11.2 DIVERSION PROGRAM IMPLEMENTATION

All of the programs described in Section 11.1 will be implemented during the course of the short-term (1992-1995) and medium-term (1996-2000) planning periods. The following subsections provide details regarding which agencies, departments, or individuals will be responsible for actual implementation of each program, as well as scheduled start dates and completion dates.

11.2.1 Source Reduction

Presented in Table 11-1 are the selected source reduction programs and the designated entities responsible for operating the programs. Also provided are start and completion dates for the implementation of each selected program.

Table 11-1 Implementation of Selected Source Reduction Programs

Selected Source Reduction Programs	Responsible Entity	Start Date*	Completion Date*
Existing Program #1: **Bargain Barn**	Central Stores/Receiving	Already Operational	Ongoing
Existing Program #2: **Computing Services E-Mail System**	Computing Services	Already Operational	Ongoing
Existing Program #3: **Inter-Departmental Programs**	Telecommunications/ VMTH	Already Operational	Ongoing
Existing Program #4: **Food Service Programs**	Food Service	Already Operational	Ongoing
Existing Program #5: **Doublesided Copiers**	ReproGraphics	Already Operational	Ongoing
Existing Program #6: **Material Reuse Program**	Central Stores/Receiving	Already Operational	Ongoing
Existing Program #7: **Doublesided Copying Service**	Quick Copy	Already Operational	Ongoing
Existing Program #8: **Microfiche Service**	ReproGraphics	Already Operational	Ongoing
New Alternative #6: Public Recognition	To Be Determined	To Be Determined	---
New Alternative #7: Product Selection Considerations	Central Stores/Receiving	To Be Determined	---

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

11.2.2 Recycling

Presented in Table 11-2 are the selected recycling programs and the designated entities responsible for their operation or implementation. Also provided are start and completion dates for the implementation of each selected program.

Table 11-2. Implementation of Selected Recycling Programs

Selected Recycling Programs	Responsible Entity	Start Date*	Completion Date*
Existing Program #1: **Project Recycle**	ASUCD	Already Operating	12/95
Existing Program #2: **Student Housing Residence Hall**	Student Housing (Carol Coventry)	Already Operating	12/95
Existing Program #3: **Student Family Housing**	Physical Plant	Already Operating	12/95
Existing Program #4: **Mixed Paper Collection**	Physical Plant	Already Operating	12/95
Existing Program #5: **ReproGraphics Recycling Program**	ReproGraphics	Already Operating	12/95
Existing Program #6: **Inter-Departmental Programs**	VMTH/A.C. Hannam/Telecommunications	Already Operating	12/95
Existing Program #7: **Central Stores/Receiving Purchasing Program**	Central Stores/ Receiving	Already Operating	12/95
New Alternative #23: **Creation of Centrally Managed, Campus-Wide Recycling Programs**	To Be Determined	1/96	12/2000

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

11.2.3 Composting

Presented in Table 11-3 are the selected composting programs and the designated entities responsible for their operation or implementation. Also provided are start and completion dates for the implementation of each selected program.

Table 11-3. Implementation of Selected Composting Programs

Selected Composting Programs	Responsible Entity	Start Date*	Completion Date*
Existing Program #1: **Manure Composting Program**	Physical plant	Already Operating	12/95
New Collection Alternative #1: **Expand Existing Source Separated Collection**	Physical Plant	1/96	3/96
New Processing Alternative #1: **Expanded Manure Composting Program**	Physical Plant	1/96	3/96
New Processing Alternative #5: **Wood and Green Waste Chipping Program**	Physical plant	1/96	3/96

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

11.2.4 Special Waste

Presented in Table 11-4 are the selected special waste programs and the designated entities responsible for their operation or implementation. Also provided are start and completion dates for the implementation of each selected program.

Table 11-4. Implementation of Selected Special Waste Programs

Selected Special Waste Programs	Responsible Entity	Start Date*	Completion Date*
Alternative #1: **Continue use of asphalt and concrete as roadbed material**	Physical Plant	Already Operational	Ongoing
Alternative #2: **Continue source separation and special collection of scrap metals**	Physical Plant	Already Operational	Ongoing
Alternative #3: **Continue source separation and special collection of wood wastes**	Physical Plant	Already Operational	Ongoing
Alternative #4: **Continue tire salvaging at landfill**	Physical Plant	Already Operational	Ongoing

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

11.3 DIVERSION RATE PROJECTIONS

Each of the programs selected for implementation (or continued operation) during the short-term and medium-term planning periods is intended to reduce the amount of solid waste that must be landfilled. Tables 4-6 (Source Reduction), 5-4 (Recycling, 6-2 (Composting), and 7-6 (Special Wastes) provide details on the materials and quantities that are expected to be diverted by each of the individual programs. The cumulative impact of these programs will achieve a net diversion rate of 25 percent or greater by 1995, and 50 percent or greater by the year 2000. Summarized below in Table 11-5 are the cumulative diversion rate projections for all of the selected diversion programs described in Sections 11.1 and 11.2.

It should be noted that the diversion rates shown in Table 11-5 assume that the waste stream composition remains constant over the timeframe considered, and thus the diversion rates will also remain constant.

Table 11-5. Projected Total Diversion from Selected Programs (Shown in % of total waste generated)*

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Source Reduction Programs:										
Total		2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Recycling:										
Campus-Wide Program	2.9	2.9	2.9	2.9	2.9	5.0	7.1	9.2	11.3	13.3
Composting:										
Manure Composting	16.5	16.5	16.5	16.5	16.5	28.2	28.2	28.2	28.2	28.2
Wood Waste Chipping	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.7	3.7
Special Wastes:										
Scrap Metals	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Concrete & Asphalt	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Transformation:										
Wood Waste	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.4	1.4	1.4
Dead Animals	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.2	1.2
Total Diversion	38.2	40.9	40.9	40.9	40.9	61.0	63.1	65.2	67.3	69.3

*** NOTE: Dates shown are considered to be conservative estimates. UCD hopes to accelerate the start and completion dates into the short-term planning period if possible.**

UCD CENTRAL STOREHOUSE T. _VE MONTHS USAGE REPORT

RECYCLE PRODUCTS IN STOCK:

63741-100	TOILET TISSUE ROLLED 4 1/2 X 4 1/2 1000 SHEETS/ROLL #125	CS	859
63749-100	DOOR MAT RECLAIMED, AUTO TIRE 24 X 36	EA	11
70749-125	TONER CARTRIDGE FOR HP LASERJET PRINTER BLACK	BX	99
70749-126	TONER FOR LASERJET SERIES II	BX	440
71104-100	XEROX PAPER 8-1/2X11 WHITE 20# RECYCLED	RM	839
71383-156	COMPUTER PAPER 14 7/8 X 11 1/2 BLUE PAR RECYCLED 1 PART	CS	130
71653-130	ENVELOPE PLAIN WHITE WOVE LEGAL 4-1/8 X 9-1/2 500/BX	BX	316
71663-530	WHITE ENVELOPE U OF C RETURN 4 1/8 X 9 1/2 500/BX	BX	450
71663-557	WHITE ENVELOPE U OF C RETURN W/WINDOW, 4 1/8 X 9 1/2	BX	102

MAY CONVERT TO RECYCLE PRODUCTS:

70749-114	TONER CARTRIDGE FOR LASERJET SERIES IIP PRINTER	BX	49
71521-109	SCRATCH PAD 4 X 6 SUB 16 WHITE 12/PG	PG	1,996
71521-112	SCRATCH PAD 8-1/2 X 11 SUB 16 WHITE 12/PG	PG	188
71521-130	SCRATCH PAD 2-3/4 X 4-1/4 SUB 16 WHITE 12/PG	PG	343
71521-134	SCRATCH PAD 5 1/2 X 8 1/2 SUB 16 WHITE 12/PG	PG	414
71531-105	SCRATCH PAD 8 1/2 X 11 SUB 16 YELLOW RULED 12/PG	PG	4,663
71531-110	SCRATCH PAD 8 1/2 X 14 SUB 16 YELLOW RULED 12/PG	PG	68
71531-113	SCRATCH PAD 8 1/2 X 11, RULED WHITE 12/PG	PG	1,284

POTENTIAL FOR CONVERTING TO RECYCLE PRODUCTS:

63740-104	PAPER TOWEL WINDSHIELD 9 1/2 X 10 1/4	CS	2,492
63740-107	PAPER TOWELS, SINGLE FOLD BROWN 9-1/2 X 10-1/4	CS	3,103
63740-115	PAPER TOWELS MULTIFOLD WHITE 9-1/2 X 9-1/2	CS	5,506
63740-304	PAPER TOWELS ROLLED NATURAL 8 1/2 IN WIDE	CS	1,509
63741-105	TOILET TISSUE, ROLLED 4-1/2 X 4-1/2	CS	2,759
71108-522	XEROGRAPHY PAPER 8 1/2 X 11 SUB 20 WHITE	RM	216,874
71108-524	XEROGRAPHY PAPER 8 1/2 X 11 SUB 20 WHITE 3-HOLE	RM	41,637
71233-101	COMPUTER PAPER 9-1/2 X 11 PLAIN WHITE 1-PART	CS	715
71233-103	COMPUTER PAPER 11 X 14-7/8 PLAIN WHITE 1-PART	CS	606
71233-107	COMPUTER PAPER 12 X 8-1/2 PLAIN WHITE 1 PART	CS	23
71233-108	COMPUTER PAPER KLEEN EDGE 9 1/2 X 11 PLAIN WHITE 1 PART	CS	934
71233-117	COMPUTER PAPER 8-1/2X5-1/2 PLAIN WHITE 1-PART 18#BOND	CS	26
71233-133	PAPER,Z-FOLD JET 8-1/2 X 11 20# FOR HP JET PRINTERS	RM	231
71383-106	COMPUTER PAPER 14-7/8 X 11 GREENTINT BAR 1 PART	CS	2,268
71383-133	COMPUTER PAPER 11 3/4 X 8 1/2 GREENTINT BAR 1 PART	CS	9
VARIOUS	FILE FOLDERS		

8/16/91

Central Stores/Receiving Department
University Of California, Davis

BARGAIN BARN NEWS

Excess & Surplus Property Sales

DECEMBER 1991

1991-92 GROSS SALES AS OF SEPTEMBER 30, 1991

	ITEMS	AMOUNT
TO DEPARTMENTS	317	$17,595.50
TO PUBLIC	287	$65,944.28
RETURNED TO CAMPUS		$66,969.38

BARGAIN BARN INFORMATION

HOURS:	Monday - Thursday	8:15-11:30 a.m.
	Friday	8:15-1:00 p.m.
PHONE NO:	(916) 752-2145	
LOCATION:	Central Stores/Receiving Building.	

BARGAIN BARN PAYMENT POLICY

The Bargain Barn policy for payment is as follows:
Personal Checks for up to $100., cash, cashier's checks, money orders or traveler's checks will be accepted.
Payable to: UC Regents. A cash receipt shall be produced for each transaction.

Holiday

The Bargain Barn will be closed on December 24,25, 31 and January 1 for Christmas and New Years. Happy holidays and New Year to all of you from the Bargain Barn.

GREAT DEAL

Electronic Stand-up Lift. Features include a 2,500lb. lifting capacity, lifting height of 10ft, standing height of 95" and a fork length of 36". This Machine is in fair working condition and has been maintained and operated by its original owner. Asking price is $900.00, which includes the battery charger. If you need additional information please call Shannon at 752-2145.

DEPARTMENT BID ITEMS

These items are available to University departments. Bids must be submitted on a Bargain Barn bid form available from the Barn. Contact the Barn during our hours for specific bid period deadlines. All items sold AS-IS.

TAG #	DESCRIPTION	CONDITION	BIDS START AT	TAG #	DESCRIPTION	CONDITION	BIDS START AT
120060	DENSITOMETER, SCANNING	GOOD	1000.00				

PUBLIC BID ITEMS

These items are available to University departments and the general public. Bids must be submitted on a Bargain Barn bid form ailable from the Barn. Contact the Barn during our hours for specific bid period deadlines. All items sold AS-IS.

TAG #	DESCRIPTION	CONDITION	BIDS START AT	TAG #	DESCRIPTION	CONDITION	BIDS START AT
120512	COMPUTER, DEC 11/23	GOOD	200.00				

PLEASE POST

DEPARTMENT SALE ITEMS

The following items are available for one month after the receiving date to University departments only: ALL ITEMS SOLD AS-IS.

DATA, LABORATORY, OFFICE AND MISCELLANEOUS EQUIPMENT

TAG #	DESCRIPTION	CONDITION	BIDS START AT		TAG #	DESCRIPTION	CONDITION	BIDS START AT	
121941	AST I/O BOARD	GOOD	32.50		125251	MEMORY UPGRADE 4MB; HP	GOOD	300.00	
121037	BENCH CABINET, STEEL	GOOD	80.00		125417	MIMEOGRAPH MACHINE (3)	FAIR	100.00	ea
122988	CABINET, WALL W/SLANT TOP	FAIR	25.00		111323	MONITOR, COLOR IBM	FAIR	35.00	
122989	CABINET, WALL W/SLANT TOP	FAIR	35.00		111029	MONITOR, HP GRAPHICS (10)	GOOD	100.00	ea
120374	CALCULATOR	GOOD	30.00		123614	MONITOR, IBM (2)	FAIR	40.00	ea
123011	CHAIR W/WHEELS	FAIR	30.00		124502	MONITOR, IBM PC COMPATABLE	POOR	25.00	
122395	CHAIR, BLACK TYPING	FAIR	25.00		122948	MYOGRAPH FEEDBACK EQUIPMENT	FAIR	50.00	
116082	CHAIR, STATIONSARY ORANGE	GOOD	25.00		122944	MYOGRAPH FEEDBACK EQUIPMENT	GOOD	400.00	
121156	CLEANER, ALL PURPOSE	NEW	10.00		125247	PC CONVERTOR PRINTER, IBM	GOOD	25.00	
125244	COLOR CARD, HERUCULES TN	GOOD	33.00		125242	PEN ORGANIZER, HP	GOOD	19.00	
125316	COMPUTER, IBM (NO MON OR KYBD)	FAIR	200.00		124325	PRINTER, DIABLO	GOOD	300.00	
123664	COMPUTER, IBM XT	FAIR	150.00		111367	PRINTER, DIGITAL	FAIR	150.00	
125252	COPROCESSOR 16MHZ 387, HP	GOOD	150.00		116083	PRINTER, SOUNDHOOD	GOOD	50.00	
123901	DESK	GOOD	100.00		111818	PRINTER, SPINWRITER	GOOD	200.00	
122986	DESK YELLOW	FAIR	60.00		105863	PROJECTOR, MOVIE 8MM	GOOD	150.00	
121039	DRILL PRESS, SENSITIVE	GOOD	100.00		125246	RADIUS FULL PAGE DISPLAY STAND	GOOD	230.00	
121040	DUST COLLECTOR	GOOD	255.00		121949	RADIUS FULL PAGE INNERFACE	GOOD	110.00	
122992	ELECTROCARDIOGRAPH CART (2)	FAIR	100.00	ea	125249	RADIUS GREY SCALE INNERFACE (2)	GOOD	230.00	
122960	ENCEPHALOGRAPH ANALYSER EQUIP	GOOD	200.00		124373	REHABILITATION UNIT, ORTHOTRON	GOOD	4000.00	
122947	ENCEPHALOGRAPH ANALYSER EQUIP	GOOD	350.00		125241	SCANJET PLUS SCANNER INNERFACE	GOOD	120.00	ea
121950	EVEREX ADAPTER CONTROLLER	GOOD	32.50		122985	SHAKER, PAINT & CHEMICAL	FAIR	50.00	
122945	FEEDBACK THERMOMETER	GOOD	400.00		125644	SPECTROFLUOROMETER	FAIR	100.00	
125243	FLOPPY DRIVE, ZENITH	GOOD	143.00		123012	SURGICAL LIGHTS	FAIR	150.00	
121945	FORWARD COLLATOR, HP (2)	GOOD	19.00	ea	112029	TABLE 30 X 60	GOOD	50.00	
121942	HEAD CLEANING DISKETTS; 5"	NEW	10.00		123663	TAPE DISPENSER	FAIR	50.00	
121038	HOIST	GOOD	250.00		112047	TRUCK LIFT, 1000LB CAPACITY	GOOD	750.00	
100197	INTEGRATING RECORDER, HP (2)	GOOD	500.00	ea	121944	VIDEO ADAPTER, VECTRA MULTIMDE	GOOD	80.00	
121943	KEYBOARD, KEYTRONIC (2)	GOOD	49.50	ea	122955	VIDEOCASSETTE RECORDER, SONY	NEW	1000.00	
120663	LETTERING MACHINE;KROI	GOOD	400.00		125255	ZENITH 386SX UPGRADE	GOOD	160.00	
122987	LOVE SEAT, BROWN	FAIR	35.00		121948	ZENITH EXP CARD 1MB (2)	GOOD	100.00	ea
					125254	ZENITH MEMORY UPGR Z-200	GOOD	30.00	
					109582	ZENITH ROM UPGRADE (6)	GOOD	15.00	ea

PUBLIC SALE ITEMS

The following items are available to University departments and the general public: ALL ITEMS SOLD AS-IS.

MISCELLANEOUS EQUIPMENT

TAG #	DESCRIPTION	CONDITION	BIDS START AT		TAG #	DESCRIPTION	CONDITION	BIDS START AT	
0121049	ABRASIVE CUT-OFF SAW	GOOD	600.00		125049	MERLIN LETTERING SYSTEM	POOR	25.00	
125337	ACOUSTICAL COVER	GOOD	0.00		102425	MILK DISPENSER, REFRIGERATED	GOOD	100.00	
120592	AGFA COPY CAMERA & PROCESSOR	GOOD	2000.00		111824	MILLING MACHINE, HORIZONTAL	GOOD	500.00	
119787	BARREL HOLDERS	FAIR	5.00		116347	MILLING MACHINE, VERTICAL	GOOD	400.00	
125220	BATH-AID, AMSCO	FAIR	80.00		119600	MODEM PLUG IN CARDS	GOOD	3028.00	
124173	BENCH, PADDED	NEW	125.00		122382	MOVIE PROJECTOR	FAIR	100.00	
114821	BLACKBOARD	GOOD	75.00		119155	OFFSET PRESS	POOR	1500.00	
125216	CABINET 24 X 47	FAIR	20.00		122360	ORGAN, HAMMOND	GOOD	600.00	
125218	CABINET 35 X 22 NO TOP	FAIR	20.00		105457	PAGER & CHARGER	GOOD	50.00	
122782	CABINET WOODEN	FAIR	30.00		121028	PANEL BOX FOR SCOOTER	GOOD	899.00	
122984	CABINET, WOODEN FLOOR	FAIR	25.00		122975	PHARMACY UNIT DOSE CART	FAIR	40.00	
119036	CABINET;SMALL FLOOR	FAIR	15.00		125046	PHOTOGRAPHY PRINT DRYER	FAIR	450.00	
103626	CAMERA, SONY BETA RECORDER	FAIR	150.00		123721	PHOTOPROCESSOR	FAIR	2500.00	
123838	CAMPER SHELL, FLAIR ROVEL	GOOD	400.00		122185	PIANO BENCH	FAIR	75.00	
125135	CART STAINLESS STEEL	FAIR	25.00		122361	PIANO, EVENETT	FAIR	400.00	
125238	CART W/WHEELS	FAIR	30.00		122979	PLANTER, WOODEN	FAIR	40.00	
112368	CASH REGISTER	GOOD	200.00		122029	POWER PUNCH PRESS, 8-TON	GOOD	200.00	
119170	CORING & PERFORATOR	FAIR	2500.00		122954	PRINTER, DEC LA100	POOR	25.00	
123186	CRANK BED (9)	FAIR	40.00	ea	125231	PROJECTOR, MICROSCOPE SLIDE	FAIR	200.00	
116349	DENTIST CHAIR	GOOD	25.00		100649	PROJECTOR, MOVIE	GOOD	50.00	
119788	DESKS, 8 SINGLE STUDENT	FAIR	10.00		122972	PULMONAIRE WATERLESS SPIROMETE	FAIR	75.00	
125416	DOORS, ALUMINUM PANE GLASS	GOOD	350.00		115136	READING MACHINE	GOOD	10.00	
121047	DRILL PRESS	FAIR	400.00		110486	ROLL BALER	FAIR	5000.00	
124868	DRUM CRADLE (2)	GOOD	30.00	ea	112314	SAFE PC FOR LOCKING COMP UNIT	GOOD	50.00	
125333	ECOLYZER, GAS-RESP	GOOD	200.00		112490	SIDE PANELS FOR STEELCASE DESK	NEW	60.00	
122981	ELECTROCARDIOGRAPH, H.P.	FAIR	100.00		121578	SLIDE HOLDER	GOOD	100.00	
115950	ENLARGER, OMEGA D-2	FAIR	100.00		122980	SOAP DISPENSER, CONT. (77)	NEW	100.00	ea
123617	FAX MACHINE, BURROUGHS	FAIR	50.00		125035	SOFA	GOOD	100.00	
120605	FREESTANDING PAPER CUTTER	GOOD	300.00		122974	SPIROMETER	FAIR	45.00	
104863	FREEZER	FAIR	100.00		121155	STAND-UP LIFT, ELECTRIC	FAIR	900.00	
121369	FREEZER	FAIR	50.00		122186	SYNTHESIZER W/CPU & KEYBOARD	POOR	1500.00	
111813	FREEZER, FROSTLESS	FAIR	25.00		124172	TAB FILE SHELVES	GOOD	30.00	
124284	FREEZER, REVCO	POOR	500.00		122778	TABLE END	FAIR	25.00	
124285	FREEZER, SO-LOW	POOR	2500.00		114972	TABLET COUNTER	GOOD	100.00	
123742	FREEZER, ULTRA COLD	POOR	400.00		123565	TAPE RECORDER, SONY	FAIR	25.00	
122976	GURNEY, COLSON	FAIR	150.00		105284	TELECOM DEVICE FOR DEAF (5)	FAIR	50.00	ea
122977	GURNEY, HAUSTED	FAIR	150.00		115723	TILE SAW, FELKER 810	GOOD	425.00	
125164	KILN CRAFTER	FAIR	100.00		125240	TRACTOR MOWER, CHALMERS	POOR	250.00	
111420	LIGHT TABLE	GOOD	200.00		119037	TRASH CANS 2 REC, 1 ROUND	FAIR	5.00	
111534	LINE DRIVER (3)	GOOD	50.00	ea	125042	TYPEWRITER, IBM	GOOD	50.00	
120801	LIQUID CHROMATOGRAPH	FAIR	2000.00		125047	UPHOLSTERY TOOLS (ASSORTED)	GOOD	40.00	
121241	MANUALS, VAX	FAIR	100.00		125420	WATRER SOFTENER	GOOD	1000.00	

PUBLIC SALE ITEMS (CONT.)

LABORATORY EQUIPMENT

TAG #	DESCRIPTION	CONDITION	BIDS START AT	
102366	CALCIUM ANALYZER	FAIR	50.00	
110951	CELL SIZER & PARTICLE COUNTER	GOOD	7500.00	
112726	CENTRIFUGE	POOR	200.00	
101739	CHLORIDOMETER	FAIR	50.00	
119826	COLORIDOMETER	GOOD	130.00	
110979	COULTER COUNTER	GOOD	7000.00	
124870	CRYOSTAT	POOR	100.00	
125295	DEFIBRILLATOR, CARDIAC	FAIR	250.00	
111412	DIGITAL PLOTTER	GOOD	1500.00	
111414	DIGITIZER/ANALYZER	GOOD	2000.00	
115938	DRYER, POINT LAB.	FAIR	50.00	
122513	ELLIPSOMETER	GOOD	1000.00	
124863	EQUIPMENT BAY	GOOD	50.00	
124862	EQUIPMENT BAY	GOOD	25.00	
114998	FIBROMETER	FAIR	75.00	
108628	FLOUOMETER	FAIR	20.00	
419801	FRACTION COLLECTORS 4 EACH	FAIR	30.00	
109919	FREEZE DRYER TRAP	GOOD	50.00	
109920	FREEZER	POOR	500.00	
111814	GAMMA COUNTER	POOR	2500.00	
115937	MICROSCOPE ELECTRON/SCANNING	FAIR	8000.00	
101687	MICROSCOPE, COMPOUND TIYODA	GOOD	800.00	
119227	MICROSCOPE, ELECTRON PHILLIPS	POOR	100.00	
123827	MICROSCOPE, LIETZ	GOOD	800.00	
123824	MICROSCOPE, STEREO	GOOD	450.00	
120555	MICROSCOPE, TIYODA (4)	GOOD	450.00	ea
124861	OSCILLOSCOPE, TEKTRONIX	FAIR	50.00	
124864	PH METER	POOR	15.00	
113298	PLOTTER-FUNCTION/ART SAMPLER	GOOD	50.00	
111291	PROTEIN SEQUENCER	GOOD	5000.00	
112391	SCINTILLATION COUNTER	FAIR	100.00	
112313	SPECTROMETER, HIGH FIELD VERT.	FAIR	50000.00	
120439	SPECTROPHOTOMETER	FAIR	400.00	
111389	SPECTROPHOTOMETER	GOOD	500.00	
124865	SURGERY LIGHT (4)	FAIR	20.00	ea
124869	TABLE, SURGERY STAINLESS	GOOD	100.00	
123810	TESIOMETER	FAIR	150.00	
120373	WATER BATH CIRCULATOR	FAIR	200.00	

OFFICE EQUIPMENT

TAG #	DESCRIPTION	CONDITION	BIDS START AT	
123507	CHAIR	GOOD	50.00	
119942	CHAIR	GOOD	25.00	
125388	CHAIR	GOOD	40.00	
112681	CHAIR (2)	GOOD	20.00	ea
111776	CHAIR ORANGE W/WHEELS	FAIR	40.00	
121072	CHAIR, ORANGE FABRIC	GOOD	25.00	
122115	CHAIR, STATIONARY	FAIR	35.00	
111020	CHAIR, SECRETARIAL, YELLOW	GOOD	30.00	
112376	CHAIRS STATIONARY (4)	GOOD	10.00	ea
125556	COMPUTER STAND (2)	GOOD	100.00	ea
111774	COMPUTER TRAYS	GOOD	25.00	
121114	CONFERENCE TABLE (BOAT SHAPE)	FAIR	50.00	
119156	COPIER SYSTEM	GOOD	25000.00	
124571	COPIER, CANON	GOOD	500.00	
123571	COPIER, SAVIN 880	GOOD	150.00	
102427	COPIER, SAVIN DESKTOP	POOR	150.00	
125461	COPIER, TEKTRONIX COLOR	FAIR	50.00	
121252	COPY MACHINE, XEROX	FAIR	500.00	
125234	END TABLE, GREY	GOOD	30.00	
125233	END TABLE, GREY	GOOD	30.00	
125235	END TABLE, GREY	GOOD	30.00	
125338	EXAM TABLE	FAIR	150.00	
114605	EXTENSION, TRIANG DESK/TABLE	FAIR	10.00	
102814	FACIMILE XEROX 455	FAIR	200.00	
121453	MICRO-FICHE	GOOD	40.00	
122068	MICROFILM READER	GOOD	75.00	
111418	MONITOR, OZONE/AIR	POOR	1900.00	
120276	OFFICE CHAIRS	GOOD	15.00	
120273	OFFICE CHAIRS (5)	FAIR	20.00	ea
111865	ORANGE PANEL	FAIR	15.00	
111864	ORANGE PANEL	FAIR	15.00	
111862	PANEL	FAIR	15.00	
111863	PANEL	FAIR	15.00	
121324	PANEL	GOOD	50.00	
121326	PANEL	GOOD	50.00	
121322	PANEL	GOOD	125.00	
121325	PANEL	GOOD	50.00	
121327	PANEL	GOOD	50.00	
121328	PANEL	GOOD	50.00	
121620	PANEL	FAIR	20.00	
105484	PANEL GREEN	FAIR	20.00	
123894	PANEL WESTINGHOUSE 36 X 40	GOOD	25.00	
125274	PANEL, 3-48 X 60	GOOD	100.00	
122393	PANEL, BEIGE	GOOD	75.00	
123893	PANEL, LT. BROWN 30 X 42	GOOD	25.00	
123892	PANEL, LT. BROWN 30 X 42	GOOD	25.00	
123897	PANEL, WERSTINGHOUSE 11 X 40 (4)	GOOD	25.00	ea
125009	PANEL, WESTINGHOUSE 16X60	FAIR	30.00	
121806	PANEL, WESTINGHOUSE 24 X 40 (7)	GOOD	25.00	ea
125003	PANEL, WESTINGHOUSE 24X40 (4)	FAIR	35.00	ea
125005	PANEL, WESTINGHOUSE 36X60	FAIR	50.00	
119955	PANEL, WESTINGHOUSE 60 X 40 (2)	GOOD	25.00	ea
111861	PANELS	FAIR	30.00	
121604	PANELS	GOOD	50.00	
112379	PANELS (18)	GOOD	150.00	ea
100474	PANELS TAN/ORANGE	GOOD	10.00	
125275	PANELS, 2-48 X 48	GOOD	75.00	
125278	PANELS, 4 48 X 24 MAUVE	GOOD	100.00	
125279	PANELS, 4 48 X 24 MAUVE	GOOD	100.00	
125280	PANELS, 48 X 18 MAUVE	GOOD	150.00	
125276	PANELS, 48 X 30 & 48 X 12	GOOD	50.00	
125277	PANELS, 5 48 X 36 MAUVE	GOOD	125.00	
112877	TABLE	FAIR	75.00	
115933	TABLE	GOOD	75.00	
122791	TABLE END 21 X 30	FAIR	25.00	
124248	TABLE, 97 X 30	GOOD	75.00	
125037	TABLE, END	GOOD	40.00	
122982	TABLE, WOODEN END	FAIR	25.00	
112883	TYPING EXTENSION	GOOD	15.00	
124171	TYPING EXTENSION	GOOD	15.00	
121315	WESTINGHOUSE PANEL	NEW	75.00	
105519	WORDPROCESSING SYSTEM	GOOD	250.00	
119491	WORDPROCESSING WORKSTATION	GOOD	250.00	
121618	WORK STATION	FAIR	95.00	

PUBLIC SALE ITEMS (CONT.)

DATA EQUIPMENT

TAG #	DESCRIPTION	CONDITION	BIDS START AT	
119585	ACOUSTIC COUPLER	GOOD	25.00	
121232	COMPUTER	GOOD	165.00	
122488	COMPUTER ANALOG MICRO MICRO	GOOD	50.00	
115554	COMPUTER DIGITAL 11/34	GOOD	500.00	
114335	COMPUTER WORKSTATION 4000	GOOD	200.00	
103168	COMPUTER, ALTOS	FAIR	125.00	
120661	COMPUTER, ASI 800T	GOOD	300.00	
124759	COMPUTER, AT&T 6300 (5)	GOOD	290.00	ea
112827	COMPUTER, CRT WORKSTATION	GOOD	300.00	
122567	COMPUTER, DEC RAINBOW	GOOD	500.00	
112608	COMPUTER, DEC RAINBOW (3)	FAIR	150.00	ea
113441	COMPUTER, DSK DR,TAPE DR	FAIR	1000.00	
123791	COMPUTER, HP MODEL 45	GOOD	800.00	
123792	COMPUTER, HP VECTRA	FAIR	450.00	
124282	COMPUTER, IBM	POOR	100.00	
121878	COMPUTER, IBM PC	GOOD	350.00	
122602	COMPUTER, MAC +	GOOD	600.00	
111178	COMPUTER, NEC APC III	POOR	500.00	
122952	COMPUTER, OSBORNE	GOOD	100.00	
111815	COMPUTER, OSBORNE (2)	GOOD	200.00	ea
113209	COMPUTER, OSBORNE I	FAIR	50.00	
116400	COMPUTER, POWERMATE 386/20	POOR	500.00	
111330	COMPUTER, RADIO SHACK	GOOD	75.00	
100260	COMPUTER, RAINBOW	GOOD	550.00	
100484	COMPUTER, RAINBOW 100	FAIR	500.00	
120572	COMPUTER, TEKTRONIX	FAIR	75.00	
121129	COMPUTER, VAX 11/750	FAIR	1000.00	
124983	COMPUTER, VAX 11/750	GOOD	250.00	
124984	COMPUTER, VAX 11/750	GOOD	250.00	
124986	COMPUTER, VAX 11/785	GOOD	1000.00	
124987	COMPUTER, VAX 11/785	GOOD	1000.00	
124985	COMPUTER, VAX 11/785	GOOD	1000.00	
125229	COMPUTER, ZENITH	FAIR	35.00	
121256	CUTSHEET FEEDER, EPSON	NEW	10.00	
121137	DATARAM DR224-8 8MB FOR VAX II	GOOD	1000.00	
121131	DATARAM MS750CA	GOOD	250.00	
121138	DEC BA23-A 5.25"CHASIS SUPPLY	GOOD	700.00	
121132	DEC DMF32-LP SERIAL/PARALLEL	GOOD	400.00	
121136	DEC KA630-AA MICROVAX II CPU	GOOD	1500.00	
121130	DEC MS750 1 MEG MEMORY ARRAY	GOOD	250.00	
19523	DIABLO PRINTER	GOOD	150.00	
1747	DISC DRIVE, DATA SYSTEM	GOOD	50.00	
21140	EMULEX CC04 SERIAL LINE CONT.	GOOD	500.00	
121141	EMULEX CP34-16 & LINE PANELS	GOOD	1000.00	
121139	EMULEX SC03-MS DISK CONTROLLER	GOOD	500.00	
121134	EMULEX SC41MS MSCP SMD DISK	GOOD	500.00	
121142	EMULEX TC03 TAPE COUPLER	GOOD	500.00	
111364	EXXON PROCESSOR	GOOD	500.00	
121298	FAX MODEM, APPLE (2)	NEW	375.00	ea
111415	FILE MANAGER, FLOPPY DISK DRIV	GOOD	1000.00	
108800	FLOATING POINT ACCELERATOR BD	GOOD	2800.00	
101823	FOLDING MACHINE	FAIR	100.00	
124746	HARD DRIVE 20MB PS/2 (4)	GOOD	75.00	ea
114864	LASER PRINTER, IMAGEN 7320	GOOD	12000.00	
123532	MAGIC I/O EVEREX	GOOD	25.00	
121144	MDB MLSI-BA11 EXTENDER CHASIS	GOOD	250.00	
121145	MDB MLSI-LP11 LINE PRINTER CON	GOOD	100.00	

TAG #	DESCRIPTION	CONDITION	BIDS START AT	
123722	MICROSETTER II INTERFACE	GOOD	700.00	
119168	NBI OFFICE AUTOMATION SYSTEM	GOOD	30000.00	
119400	PC NETWORK	GOOD	800.00	
121382	PC, LEADING EDGE	GOOD	150.00	
125462	PLOTTER, TEKTRONIX	FAIR	50.00	
119522	PRINT TERMINAL DIABLO	GOOD	250.00	
115777	PRINT TERMINAL, PORTABLE	FAIR	25.00	
114371	PRINTER	POOR	100.00	
114891	PRINTER	GOOD	400.00	
122557	PRINTER	FAIR	100.00	
119528	PRINTER (3)	GOOD	150.00	ea
119502	PRINTER DIABLO 630	GOOD	250.00	
121392	PRINTER, APPLE	GOOD	45.00	
100257	PRINTER, APPLE IMAGEWRITER II	POOR	50.00	
101420	PRINTER, APPLE IMAGEWRITER LQ	POOR	200.00	
120537	PRINTER, C. ITOSH	GOOD	100.00	
119154	PRINTER, CENTRONICS	FAIR	100.00	
113208	PRINTER, COMREX CR11	GOOD	150.00	
111816	PRINTER, DAISYWRITER	FAIR	150.00	
113329	PRINTER, DECWRITER	FAIR	100.00	
111348	PRINTER, DIABLO	GOOD	75.00	
112813	PRINTER, DIABLO	GOOD	500.00	
125354	PRINTER, DIABLO	GOOD	50.00	
113757	PRINTER, DIABLO 1640	GOOD	125.00	
105286	PRINTER, DIABLO LQ34 (2)	GOOD	300.00	ea
111180	PRINTER, DIGITAL	FAIR	50.00	
100259	PRINTER, EPSON	FAIR	125.00	
125313	PRINTER, IBM	POOR	50.00	
124754	PRINTER, IBM	POOR	20.00	
124753	PRINTER, IBM	FAIR	50.00	
124751	PRINTER, IBM	FAIR	25.00	
120632	PRINTER, [illegible] QUIETWRITER	GOOD	600.00	
122886	PRINTER, IMAGE WRITER	GOOD	150.00	
125489	PRINTER, LASER NEC (2)	FAIR	600.00	ea
114865	PRINTER, LASERJET [illegible]	GOOD	8000.00	
120533	PRINTER, NEC	GOOD	400.00	
114829	PRINTER, NEC SPINWRITER	POOR	100.00	
116344	PRINTER, NEC SPINWRITER	FAIR	40.00	
116341	PRINTER, NEC SPINWRITER	FAIR	40.00	
103170	PRINTER, OKIDATA	FAIR	100.00	
112814	PRINTER, QUME	GOOD	275.00	
104569	PRINTER, RADIO SHACK	FAIR	30.00	
122187	PRINTER, SYNCLAIVIER II	FAIR	100.00	
104568	PRINTER, TEKTRONICS	POOR	100.00	
111179	PRINTER, TI	FAIR	125.00	
104570	PRINTER, TOSHIBA P351	GOOD	100.00	
102426	PRINTER, XEROX	GOOD	100.00	
122184	PRINTR, TOSHIBA	GOOD	500.00	
107032	SHEET FEEDER AUTO QUME	FAIR	230.00	
121285	SHEET FEEDER, EPSON	NEW	18.00	
121143	TK50-AA DRIVE W/TOK50-AB CONT.	GOOD	1500.00	
121301	TRACTOR UNIT EPSON 7304	NEW	27.00	
121289	TRACTOR UNIT, EPSON (6)	NEW	15.00	ea
134981	UNISYS EQUIPMENT	GOOD	0.00	
121054	VERSA LOCK ANCHOR PAD	GOOD	50.00	
104366	WORD PROCESSOR, IBM	GOOD	0.00	
111301	WORD PROCESSOR, IBM	GOOD	2000.00	

Please note that all items are subject to prior sale

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UC Davis Publications List
1991

Accounting Office Notes, Accounting Office
Contact Colleen Shryne, 757-8502
For the accounting staff and department, this technical newsletter fills in its readers on information for payroll directions, sales and use taxes, etc.

AFP Network, Aquaculture and Fisheries Program
Contact Jan Campbell, 8-noon, 752-4508
Published on an every-other-week basis, this newsletter includes news on research, grants, calendar events and personnel issues. It's sent to faculty, staff, graduate students and some affiliated departments.

Aggie Sports News, UC Davis Sports Information Office
Contact Tom Hall, 752-3505
This weekly tip sheet is sent to the news media in the Sacramento area. It offers statistics and news on the various Aggie student sports teams.

Benefits News, Benefits and Risk Management Office
Contact Gil Sebastian, 752-1774
This monthly newsletter offers news about UC Davis personnel benefits as well as changes in University of California policy as well as UC Davis news It's sent to all departments.

Biological Sciences Bulletin, Division of Biological Sciences
Contact Karen Guin at 752-5824
This biannual newsletter is published in fall and spring and carries important national research awards, large training grants, profiles of exemplary faculty and their accomplishments. New programs, updates, new personnel. Audience: faculty and staff members in the biological sciences campuswide.

The Botany Department Newsletter, Department of Botany
Contact Carole Nicholson, 752-4749
This informal monthly newsletter highlights benefits, policy changes and other news of interest to botany staff and faculty.

CA&ES Journal, College of Agricultural and Environmental Sciences
Contact Kathryn Devereaux, 752-8345
Aimed at faculty and staff members in the college including those in Cooperative Extension, this quarterly newsletter carries research updates, college news, administrative news, awards and other items.

The Center Fold, California Primate Research Center
Contact Julie McNeal, 752-7333
In this monthly newsletter for primate center staff and faculty, news about the UC Davis center and the other national primate centers is carried. Other information included is news on animal rights, new employees, major awards, events seminars, workshops, research and personnel updates pertaining to the primate center.

The Chicken Sheet, Vet Med Physiological Sciences; ***The Cutting Edge,*** Vet Med Surgery; also newsletters in Vet Med Epidemiology and Preventive Medicine, and Vet Med Pathology
These are department newsletters dedicated to informing faculty and staff about departmental matters

Connections and Communications, Public Service Research and Dissemination Program
Contact Joyce Gutstein, 757-8820
Published twice a year, this newsletter is sent to UC Davis deans and directors, members of the California Legislature and other interested persons throughout the nation and world. The newsletter carries information on the Public Service programs, seminars and conferences as well as summaries of small research programs funded with help from the program. Research primarily concentrates on environmental issues.

The Continuum, for Re-entry Students, Undergraduate Admissions
Contact Phil Knox, 752-2021
Aimed at prospective as well as current re-entry students at UC Davis, this annual newsletter carries news about services, networking, meetings and events pertinent to the reentry student.

CUD, News and Notes of the University Library
Contact Kate Mawdsley, 752-2110
A biweekly newsletter for library staff, this publication covers library policy and procedures, awards, activities and some outside university activities of interest to library staff members.

The Davis Graduate, The Graduate Student Association
Contact Keith Dalphin, 752-6108
Published between six and nine times a year, *The Davis Graduate* is sent to Graduate Division students, health-science academic students, and Graduate School of Management students. Carries news of interest to graduate students such as financial aid, announcements, items from graduate students. Looking for ideas.

Dateline UC Davis, Office of Public Communications
Contact Susanne Rockwell, 752-1932
This newspaper tabloid is published every other week, except monthly in December, July and August. The newspaper carries the gamut of campus and UCDMC news and announcements, including achievements, news on research and policy changes, features on faculty and staff, and campus events. Items gladly accepted.

Davis Arboretum Review, University Arboretum
Contact Gale Matteson, 752-8324
As a quarterly newsletter aimed at arboretum supporters, this newsletter wants to keep its friends informed. It carries stories on arboretum research, propagation, speakers, a little news about staff and donations

DBS News, Division of Biological Sciences
Contact Karen Guin at 752-5824
Published in winter and summer, this carries division-related news for faculty and staff in the Division of Biological Sciences. Grant news, any and all awards, scholarships, fellowships, new personnel and feature stories on issues pertaining to the division are published.

DRC News Briefs, The Disability Resource Center
Contact Lorraine Beaman, 752-3184
Aimed at UC Davis students, this quarterly newsletter offers announcements about disability issues, campus services, grants for those with disabilities, and calendar items.

Ecologic, Environmental Health and Safety Office
Contact Evelyn Profita, 752-0368
This quarterly newsletter carries environmental news as well as items on health and safety for all campus readers. It is sent to department safety representatives. Editor Profita welcomes ideas for stories on issues that affect people on campus and at home. Stories range from safe bicycle riding to how to handle hazardous materials according to EH&S policies.

Engineering News, College of Engineering
Contact Joan Crow, 752-4172
This newsletter is for faculty, staff and students at the college. It is published bimonthly and includes meeting notices, department news, research deadlines, internship opportunities, workshops and other news of interest.

Freeing Our Lives, Rape Prevention Education Program, Police Department
Contact Emily Curray, 752-3299
Published quarterly, this publication gives news of upcoming programs and classes regarding rape-prevention education, articles about assault, calendar events, legislative updates and stories on other topical issues. It also carries poetry about assault and its aftermath. The newsletter is sent to most departments, various interested faculty members, staff working with students and anyone who wants to be on the mailing list.

Geri-notes, School of Medicine, Department of Community Health
Contact Rosemary Orgren, 752-2797
This quarterly newsletter is aimed at those faculty and staff interested in geriatrics and gerontology on campus, at UCDMC, and at other health-care facilities and area agencies. It includes articles written by faculty on aspects of geriatrics and gerontology as well as news of symposia and regional and national conferences.

Graduate Studies Newsletter, Graduate Division
Contact Susan Chaffee, 752-9300
Sent to all faculty members and graduate students, this new publication will be published quarterly. It carries items on awards, grants, personnel, research and personality features. The newsletter also publishes a calendar about graduate division-sponsored seminars and events. It also covers stories about graduate education and special visitors to the campus.

Grapevine, Cowell Student Health Center
Contact Bobbi Brink, 752-2331
Published every two to four weeks, depending on time and the news, this newsletter is a personnel vehicle for the health center staff. It covers awards, policy changes, benefits news, and other worker-related items that Bobbi thinks are interesting.

Hotline, Department of Botany
Contact Carole Nicholson, 752-4749
This monthly in-house newsletter concentrates on deadlines for grants, announcements of awards, and other factual information to keep faculty and researchers updated.

House This, Student Housing Department
Contact Joan Learned, 752-2034.
A newsletter for housing career staff and student employees, this newsletter is an in-house personnel vehicle that publishes a story on an employee of the month, dates of Student Housing events, a diversity calendar, updates on construction, and other information about what people are doing within the department.

Humanities at Davis, Humanities Institute
Contact Margaret Nelson, 757-3470
Aimed at academics in the humanities and social sciences at UC Davis as well as academics overseas and museum staff, this quarterly newsletter carries a wide spectrum of news regarding the humanities and social sciences in the UC system and the California State University system. News includes articles on research, faculty achievements, new programs, conferences, and presentations. Submissions welcomed.

Insights, Veterinary Diagnostic Laboratory
Contact Joy Choate, 752-1862
Sent to staff and faculty at the five diagnostic labs in the state, *Insights* is a newsletter that publishes items of employee interest: special awards and accomplishments, employees of the month, technical staff information, and fun news like stories about staff volleyball games.

International Community Newsletter, Services for International Students and Scholars
Contact Chris Valentine, 752-0864
Published quarterly, this newsletter covers news on issues important to the international community: immigration, financial aid, tax information and travel restrictions. It also has a calendar that includes events such as International House parties.

In the Long Run, Recreation Hall
Contact Rick Meares, 752-6071
This one-page newsletter publishes on a monthly basis. It includes exercise and health tips and a calendar of recreation events for campus employees as well as some employee news.

Kernels and Chaff, Department of Agronomy and Range Science
Contact Marilee Schimdt, 752-1703
Published every other week, this newsletter is sent to faculty, staff and visitors as well as to retired employees. It carries notices on deadlines for grants and fellowships, seminar listings and news about personnel.

Material Management News, Purchasing Department
Contact Emily Galindo, 757-8707
Sent to all departments on campus and at the UC Davis Medical Center, this newsletter carries news from Purchasing, Central Stores/Receiving and Microscope Services. Information on seminars, open houses, services offered, policy changes and other items of interest are included.

The Park Messenger, Student Housing
Contact Mary Sprifke, 752-4000
Sent to residents of Solano and Orchard Park family housing, this quarterly newsletter gives out information on housing policies, reminders, updates, new births and news items that affect the residents like recycling rules and availability of community garden plots.

POWER (Program on Workable Energy Regulation), Institute for Governmental Relations with the University of California
Contact Alicia Ritter, 752-5570
POWER is sent to researchers, faculty members, regulators and other interested persons at public and private utilities interested in technical information about energy regulation and related environmental issues. The newsletter is published three times a year.

Research Resources, Office of Research
Contact Jody House, 752-9645
Recently revised and expanded, this newsletter carries announcements about research news, deadlines, fellowships and scholarships and services offered by the office. It also highlights people in research and research programs.

The Scoop, UCD Bookstore
Contact Sheri Canevari, 752-9045
Sent to 80 career staff and 200 students who work at the bookstore, *The Scoop* is a personnel-oriented newsletter to keep everybody informed about bookstore policies and employee goings-on. It's mostly written by students and published monthly except for months in which there are finals.

Signs and Symptoms, News from the Veterinary Medicine Teaching Hospital, VMTH
Contact Ann Birkhaus, 752-1899
Published 10 times a week, this newsletter carries news about clinical trials, new clinical developments and news about research. It is sent to veterinarians at the VMTH as well as to researchers.

The Tie Line, Community Housing
Contact Susie Valdrow, 752-2495
Sent to apartment managers and owners in Davis, this newsletter offers general information about services UC Davis offers for community housing and child care. It also informs the managers and owners about UC Davis' grievance counseling program for tenants and owners and prints a campus administrative calendar. *The Tie Line* comes out once a quarter during the academic year.

Tipsheet, Telecommunications
Contact Catherine Curran, 752-5965
This quarterly newsletter will be sent to all departmental telephone representatives to give them ideas and technical tips for using the telecommunication system.

Turn Around Times, Computing Services
Contact Ivars Balkits, 752-1009
This quarterly issue covers the world of computers, both inside and outside the university. It gives tips and news on the latest software programs, conflicts between programs and other news of interest to computer users. It also tells about personnel changes and other computer-related news that might affect university readers.

The UC Davis Physician, School of Medicine
Contact Kathy Garvey, 752-7639
Published for faculty, staff, alumni and friends of the School of Medicine, this twice-a-year magazine offers feature stories, news updates and stories highlight achievements within the school.

UC/AIC Quarterly, Agricultural Issues Center
Contact Sandy Fisher, 752-1520
This publication covers activities of the center, editorials from the field and related events to the AIC.

UC Davis Magazine, Office of Public Communications
Contact Teri Bachman, 752-9838
This is UC Davis' alumni magazine, which is sent to more than 100,000 persons including alumni, parents and university supporters. It carries features about the university, news briefs, alumni and development news, and announcements about achievements by faculty members.

UC Toxics News, Toxic Substances Program
Contact Melissa Mardesich, 752-2099
Sent statewide and beyond, this newsletter handles feature articles on topics related to toxic substances: news information, research updates, outstanding achievements, etc. Melissa is open to suggestions and contributions.

Update, UCDMC, Office of Hospital Public Affairs
Contact Bonnie Hyatt 734-2784, Sacramento
A monthly newsletter for staff, faculty, volunteers and friends of the Medical Center, this publication concentrates on personnel issues, policies, benefits, and features on various programs.

Vet Med News, School of Veterinary Medicine
Contact Ann Birkhaus, 752-1899
Published quarterly, Vet Med News is sent to alumni, faculty, students and departments. It covers research, lectures, calendar items, class notes, faculty awards and stories on staff.

Women's Writes, Women's Resources and Research Center
Contact Robin Whitmore, 752-3372
The *Women's Writes* calendar is published monthly October through June and welcomes news about events of interest especially for women. A quarterly *Women's Rights* journal, filled with poetry, political updates and feature stories, is also published.

Academic Courses: Extended list
Source: 1990-91 UCD General Catalog

Department	Course Number & Name
Ecology	210/Advanced Topics in Human Ecology 211/Advanced Topics in Cultural Ecology 212A/Environmental Policy Analysis 212B/Environmental Policy Evaluation 213/Population, Environment & Social Structure 232/Theoretical Ecology (Topics Vary)
Economics	193/Ecology and Economics
Engineering	
Agricultural	1/Introduction to Agricultural Engineering 245/Agricultural Waste Management
Civil	Areas of Specialization include: •Civil Engineering Planning •Environmental Engineering 30/Engineering a Better Environment 147/Solid Waste Management 152/Intro to Civil Engineering Planning 189A-J/Selected Topics 243A&B/Water and Waste Treatment

Environmental Biology and Management - The depth subject matter in this major draws from a number of disciplines such as Agricultural Economics and Environmental Studies.
Related coursework in this specific major can be found in:
110/Urban and Regional Planning

Environmental Policy Analysis and Planning - The preparatory subject matter draws from a number of disciplines such as Biological Sciences and Environmental Studies. This prepares the student to then specialize in one of the following related areas:
•Advanced Policy Analysis
•City and Regional Planning
•Environmental Science
•Water Quality

Environmental Studies	1/Environmental Analysis 10/Introduction to Environmental Studies 110/Principles of Environmental Science 126/Environmental and Occupational Epidemiology 127/Contemporary Problems in Environ. Health

	133/Cultural Ecology
	160/Environmental Decision Making
	161/Environmental Law
	164/Ethical Issues in Environmental Policy
	165/Science, Experts and Public Policy
	168A&B/Methods of Environmental Policy Analysis
	171/Environmental Planning
	173/Public Mechanisms for Controlling Land Use
	178/Applied Research Methods
	179/Environmental Impact Reporting
	190/Workshops on Environmental Problems
	212A/Environmental Policy Analysis
	212B/Environmental Policy Analysis:Evaluation
Environmental Toxicology	10/Introduction to Toxicology
	101/Principles of Environmental Toxicology
	112A&B/Toxicants in the Environment
	114A/Biological Effects of Toxicants
	114B/Biological Effects of Toxicants: Comparative Aspects
	130A-E/Selected Topics in Environmental Tox
	138/Legal Aspects of Environmental Toxicology
	203/Environmental Toxicants
	214/Mechanism of Toxic Action
	220/Analysis of Toxicants (plus Laboratory)
	228/Gas Chromatography/Mass Spectrometry of Toxic Chemicals
	234/Neurophysiological Basis of Neurotoxicology
Geology	143/Environmental Geology & Land Use Planning
Landscape Architecture	183/Landscape Ecology
	201/Theory & Philosophy of the Designed Environ
	280/Landscape Conservation
Law, School of	285/Environmental Law
	289/Toxics Law
	450/Clinical Program in Environmental Law
Management, School of	232/Urban Policy and Planning
Physics	160/Environmental Physics and Society
Political Science	102/Urban Public Policy
	107/Environmental Politics and Administration
	207/Environmental Public Policy

Resource Sciences	3/Energy and Environment 100/Concepts in Renewable Natural Resources
Sociology	102/Sociology of the Environment
Water Science	10/Water and Society 240/Infiltration and Drainage