BLUEPRINT FOR A GREEN CAMPUS

An Environmental Action Plan for the University of Colorado at Boulder

In the last decade, many institutions have made crucial changes in their approach to environmental management. These changes are motivated by the realization that it is not enough to comply with environmental regulations, but that a forward-looking commitment to dramatically reducing environmental impacts in a range of areas will payoff in the long-run, both for the individual institution and for society as a whole.

CU-Boulder needs a clear vision and strategy for addressing the environmental challenges and opportunities ahead. The "Blueprint for a Green Campus" is intended to help us identify where we can improve our existing policies and practices in order to set an example of environmental responsibility as an institution. The Blueprint for a Green Campus is an environmental action plan which proposes solutions for a wide variety of issues that CU faces. The Blueprint sets forth the following goals:

- Creating a climate-friendly campus by reducing greenhouse gas emissions by 7 percent below 1990 levels by 2010.
- Growing without increasing traffic by capping traffic at today's levels.
- Creating a safe and healthy campus by reducing hazardous waste and by minimizing exposure to toxic chemicals and pesticides.
- Greening campus consumption and disposal habits by purchasing environmentally-responsible products and by capping solid waste going to the landfill at today's volumes.

Structural and Institutional Issues

There are a number of overarching issues that have broad impacts on many of the specific issues covered by this report.

Accounting for True Costs

The internal campus "marketplace" should be adjusted to more accurately reflect true costs. Currently, many of the incentives set by the campus market encourage resource consumption. Some examples include:

- Printing is "free" in public computer labs (or rather, the costs are spread across all users in the form of a flat computing fee). Consequently, there is no incentive for individual users to conserve paper. For some perspective, compare this to copying--this is analogous to having free copiers all over campus. It would be quite feasible to charge a user's account for each page that is printed from public computer labs. This user fee could be entirely revenue neutral.

- Parking is underpriced. The user cost for parking does include construction costs and operating and maintenance costs, but does not include the underlying land value. In

central Boulder, where land can easily $1 million/acre, this dramatically undercounts the costs. For comparison, the main campus has approximately 40 acres of land devoted to parking--nearly 4 times the size of the entire Grandview area. A more accurate price would have a significant effect on travel behavior. For example, a 1997 study of the finances of CU Parking Services performed for the University by Bamberger and Associates concluded that a forty percent increase in parking fees would cause faculty and staff permit sales to go down by fourteen percent.

- In addition, parking permits could be restructured to allow users greater flexibility in purchasing parking rights. Currently, parkers must purchase permits which give the right to park on campus every day. Once they have made this purchase, there is an incentive to drive to campus every day. Using modern computer technology, it is possible to have a much more flexible system, allowing users, for example, to purchase the right to park on campus 2 times per week.

These examples leave out a whole category of costs: environmental externalities. In the above examples, the external costs to environmental quality and human health are imposed by paper production, automobile use, or energy production. While the economists tell us that it is necessary to include all of these costs in order to have a truly efficient economy, simply getting the direct costs right would be a good first step.

Another structural problem is the firewall that typically exists between capital and operating budgets for building construction. Because these funds typically come from very different sources and are budgeted separately, it is very difficult to spend more up front on efficiency measures, even if the total life cycle cost will be lowered. This leads to decisions that are both economically irrational and environmentally destructive.

Consistent Measurement and Reporting of Campus Environmental Performance

Another difficulty is the lack of any consistent measurement of campus environmental performance. Many of the steps recommended in this blueprint would require an ability to measure our environmental performance. For example, the proposal to abide by the Kyoto Protocol on climate change would require a baseline inventory on campus emissions of greenhouse gases, as well as regular updates to the inventory. The proposal to grow without increasing traffic would require an agreed upon methodology for measuring traffic volumes generated by campus activities. A formalized integrated pest management policy would need to be supported by a baseline study and ongoing tracking of pesticide and herbicide use on campus. The effort to stem the generation of solid waste requires consistent annual reporting of waste generation. In all of these areas, we recommend establishing a consistent and agreed upon methodology as well as assigning ongoing responsibility for study to an identified department.

The Need for a Campus Environmental Council

There is no high level, centralized support system for improving CU's environmental performance. Nor is there an entity on campus that exists to review the environmental

impact of campus policies, building projects or programs, or to create new environmental policies. While there are many individual entities that fill parts of this role--including the Solid Waste Advisory Board, the Boulder Campus Planning Commission, the Hazardous Materials Advisory Board, the Environmental Center, the Environmental Operations Manager within Facilities Management, and Environmental Health and Safety--this does not provide comprehensive review. Many changes get implemented with no consideration of environmental impacts or discussion of alternatives.

Many of the positive steps taken which go beyond regulatory compliance have been driven by UCSU efforts and visionary administrators. There has not been much coordinated, high-level support. This stands in contrast to schools such as the University of Texas in Houston, Brown University, or George Washington, where efforts to "green the campus" are coordinated and funded at the highest levels. Our experience here is that adoption of improved environmental programs on campus generally requires a major campaign effort by concerned students and faculty, than being initiated by the administration. The creation of a campus environmental council which could serve to advise the chancellor, with staff support, would be an important step toward implementing the master plan and this blueprint. This could also be seen by the EPA as a good faith effort towards developing a comprehensive Environmental Management System for the campus, which will help avoid future legal liability.

Creating a Climate-Friendly Campus

THE VISION: CU commits to meet the emissions reduction targets of the Kyoto Protocol which would reduce CU's greenhouse gas emissions by seven percent below 1990 levels by 2010.

Global warming is caused by excess carbon dioxide and other "greenhouse" gases (such as methane, ozone, and CFCs). These gases absorb infrared radiation and re-radiate it, increasing the surface temperature of the planet. In 1988, the nations of the world appointed the Intergovernmental Panel on Climate Change (IPCC), consisting of more than 2000 leading experts from around the world, to assess the science and economics of climate change. In a landmark 1995 report, the IPCC concluded that "the balance of evidence suggests a discernible human influence on global climate."

The evidence continues to accumulate. The planet's 12 warmest years on record have all occurred since 1980, and the 1990s as a whole have been the warmest decade in an estimated 1200 years. 1998 broke the previous record set in 1997, and 1999 has just exceeded the 1998 records.

In 1997, more than 150 nations adopted the Kyoto Protocol. Industrialized nations agreed make legally binding reductions of varying amounts in their emissions of six greenhouse gases -- carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The United States pledged to reduce its emissions of these gases by 7 percent from 1990 levels by the year 2010.

The United States Senate, however, has not ratified the agreement. In response, many institutions and corporations have committed to meeting or exceeding the Kyoto Protocol emission targets on their own. For example, the Dupont Corporation has a goal of reducing greenhouse gas emissions from their global operations (on a carbon-equivalent basis) by 45 percent by the year 2000. Tufts University has committed to meet the goal of a seven percent reduction in emissions by 2010.

We propose that the University of Colorado at Boulder take up this challenge, and join these institutions in committing to abide by the emissions reductions goals set for the United States. Given the enormous concentration of research in the atmospheric sciences at CU and the federal labs in Boulder, it would be very appropriate for CU to make this commitment.

Master Plan Language

The new master plan for CU Boulder that was adopted by the Board of Regents in February 2000 recognizes the importance of reducing greenhouse gas emissions and improving energy efficiency. The following language addresses this:

- CU-Boulder should endeavor to minimize pollutants that degrade air quality and/or that contribute to worldwide environmental concerns such as the "greenhouse effect." (Section IV.D.1)
- Upgrade institutional fleet vehicles with new cleaner-burning diesel buses and (where feasible) with vehicles using innovative technologies for propulsion such as electric and hybrid-electric. (Section IV.D.1)
- Conserve energy to mitigate environmental impacts and to reduce costs. (Section IV.D.7)
- Environmental impacts associated with the acquisition, production, and distribution of campus utilities should be minimized. (Section IV.F.2)

Current and Planned Initiatives

The design standards for new buildings include low-wattage lighting systems, envelope insulation, high-performance glazing systems, efficient cooling systems featuring evaporative cooling where appropriate, and microprocessor-based temperature controls.

Over the years, a number of significant buildings on campus have been retrofitted to bring them up to a similar standard. The Boulder campus administration also annually re-invests a portion of the associated utility savings annually back into campus buildings for a variety of purposes including piping insulation, high-efficiency motors, heat recovery systems, and window films.

In 1992, the campus built a high efficiency natural gas co-generation plant to produce both electricity and heat. Despite these efforts, campus energy use and associated emissions is growing rapidly. The current peak demand on the co-generation facility,

including the East Campus, is about 18 megawatts. Within ten years, peak demand is projected at up to 29 megawatts.

One current project is to determine the feasibility of retrofitting virtually every General Fund-supported building on campus with high efficiency lighting systems. Options for funding such an undertaking, which could take several years to implement, include partnering with a third-party entity such as an energy service company (ESCO).

The Recreation Center is instituting a new energy conservation project in partnership with Long and Associates, a private energy services contractor in Englewood. Upgrades, retrofits and modifications in lighting systems, ice rink and pool facilities, water meters, fan controls and utility tracking systems are expected to yield energy savings of more than $40,000 annually. Work is scheduled to begin right away and will take two months to complete. The $304,703 project, which included a technical energy audit, was funded with a 10-year loan from the University Treasurer's Office.

Additional Steps Needed to Achieve the Goal

CU could adopt stronger energy standards for new construction and renovation projects. Many of these steps will have a positive payback. Areas to consider include high performance windows, solar design, daylighting, efficient heating and cooling systems, and building orientation.

CU could begin purchasing renewable electricity such as WindSource, the wind-generated electricity offered by Public Service Company of Colorado. The purchase of the output of one wind turbine, at an annual cost increment of approximately $50,000, would produce 2 million kWh of electricity and would save an estimated 1,400 tons of carbon dioxide emissions, 14,000 pounds of sulfur dioxide emissions and 10,000 pounds of nitrogen oxide emissions annually if compared to the same amount of electricity produced by burning fossil fuels.

Passenger vehicle hybrids that get 60 to 70 miles per gallon are now available, and hybrid electric buses are now in use on one route in Denver. As CU replaces existing vehicles, both small passenger vehicles and buses, the purchase of hybrid electric vehicles would significantly cut carbon dioxide emissions.

Since mobile sources are a major source of greenhouse gas emissions, taking steps to cap traffic growth will also have a major impact (See transportation section).

Measurement

To measure this, we need to conduct an emissions inventory and track emissions over time.

Student Support

Last fall the Environmental Center conducted a scientific survey of student attitudes on the environment. Two of the questions addressed campus energy use. Students overwhelmingly support the purchase of wind-generated power at CU, even if it means an increase in student fees. By more than a two to one margin, respondents said they would support a fee increase of $1.00 or more per semester. (Sixty percent supported and twenty-eight percent opposed paying more than $1.00 extra). Half of those surveyed said that they would pay an extra $3.00 or more for clean energy. Some 88 percent of those surveyed said CU should invest in energy efficiency throughout campus to delay the possible need for a new power plant, while just six percent of respondents said that the university should construct a new power plant rather than invest in energy efficiency.

Growing Without Increasing Traffic

THE VISION: CU caps traffic at today's levels by growing in such a way that there is no net increase in single-occupant vehicle trips by students, faculty and staff.

One of the major effects of campus growth is an increase in automobile traffic. This results in local air pollution, increased carbon dioxide emissions, and impacts to quality of life. However, several major research universities have shown that it is possible for a campus to be a growing, vital institution without increasing the number of auto trips coming to and leaving the school. In fact, in a landlocked campus like CU, it may well be less expensive to take this innovative approach than to attempt to satisfy demand through increased parking supply. This is because any new parking will likely be in parking structures, at costs of $20,000 or more per space.

Thus, we propose that CU commit to growing in such a way that there is no net increase in single occupant vehicle trips by students, faculty, and staff. This can be achieved through a combination of market incentives, a strong commitment to transit and bicycle programs, capping the amount of parking, and developing close-in housing for students and employees.

Other campuses have shown that this is possible. For example, Stanford University has grown by 2 million square feet of new building space since 1991--a 20 percent increase -- without increasing peak period auto trips to campus. The population of the University of Washington has increased by seven percent since 1991, while vehicle trips to and from campus have decreased by five percent.

Master Plan Language

The new master plan for CU Boulder that was adopted by the Board of Regents in February 2000 recognizes the importance of increasing alternate modes access to campus, but does not attempt to cap automobile trips to campus . The master plan assumes that the current modal split--that is, the percentage of trips that occur on buses vs. cars vs. bikes or walking--will not change. This means that, as campus grows, the number of car trips

will also grow. In order to deal with this growth, the plan calls for the construction of two new parking structures in the vicinity of the main campus--one next to the stadium and one in Grandview Terrace. The policies recommended in this section of the blueprint suggest that the net supply of parking should not be increased.

The following language in the master plan shows some support for expanding non-automobile access to campus:

- Normally preferred modes of on-campus transportation are, in order: (1) walking, (2) bicycling, (3) transit, and lastly (4) driving. This encourages "environmentally friendly" transportation, meaning best use of land, minimizing air pollutants, and maximizing safety. A pedestrian-oriented environment for the heart of the campus enhances the total learning experience. Vehicular trips may be necessary for longer distances, time-urgent needs, and movement of materials. (Section IV.E.1.C)

- The limited supply and increased cost of housing in Boulder has meant that more faculty, staff, and students live longer distances away from campus. Their commutes will become more and more time consuming as traffic congestion increases, reducing the availability of faculty to students. Consequently, CU-Boulder will increase its efforts to help ensure affordable, proximate housing. (Section IV.E.1.C)

- Encourage better transit service for faculty and staff use with the intent of affecting the modal split to campus. Develop better data, combining both counts and surveys, for future modal split analysis. (Section IV.E.2.C)

Current and Future Initiatives

The faculty/staff ecopass, started in 1998, provides transit passes to all continuing employees at CU. Since the program began, transit use by employees has gone up by 88 percent, while 157 employees have given up their parking permits entirely.

The student bus pass program, begun in 1991, provides bus passes to all fee paying CU students, and to family members of students living in Family Housing. Student transit use has grown by 500 percent since the program started.

Parking on campus is an auxiliary department, so revenues from parking permits, meters, and fines cover the cost of providing parking (although the revenues do not have to cover the cost of the underlying land). The lack of free parking provides a significant incentive for alternate modes use.

CU staff are working in cooperation with RTD and the City of Boulder to plan for the new STAMPEDE shuttle linking East campus, the research park, and main campus. Current plans call for the buses to be hybrid electric vehicles.
The priority bike project is to develop a west-east route from Broadway, through Main Campus on to the East Campus.

This corridor includes Pleasant Street, walkways north of Ramaley and Porter Biology buildings, Fieldhouse Plaza, and
Colorado Avenue.(This is referenced in the master plan section IV.E.4.C).

The master plan calls for 1900 new student beds at William Village, as well as 100 units for faculty and staff. Providing
housing near campus is perhaps the single most important step for reducing trips.

Additional Steps Needed to Achieve the Goal

First, CU would need to adopt the goal of meeting additional demand generated by campus growth through non-automobile modes and demand-management techniques.

Parking supply is one of the key determinants of travel behavior. Any attempt to keep traffic generated by CU from growing will require capping total parking supply at today's levels.

Additional use of market incentives could play an important role. This could include managing demand by raising parking permit and meter costs, or the Stanford approach of paying employees a yearly payment if they choose not to purchase a parking permit.

Expanding housing supply on and near campus is another important component of a comprehensive approach to growing without more traffic. While the current master plan represents a step forward, still more could be done to develop housing for students and faculty.

There have been a variety of surveys, diary studies, and direct counts used to try to quantify traffic flows in and out of CU. Any attempt to cap automobile traffic generated by campus will require a consistent methodology to track campus transportation trends.

Creating a Safe and Healthy Campus

Part I: Minimizing Hazardous Waste

THE VISION:

- *CU reduces the amount of hazardous waste generated by the campus while maintaining the quality and quantity of research.*
- *CU continues to advance pollution prevention programs to reduce the quantity of hazardous material present on campus and to promote a safer working and learning environment.*

The Need

Hazardous materials—such as laboratory chemicals, chemical by-products, chemical handling supplies, paints, and solvents—can cause pollution and present risks to health, safety, and the environment. The improper use and disposal of hazardous chemicals have

consequences on both the health of those who handle the material and those whose water, air, and land may be polluted by leaks, spills, and volatile emissions.

While the University of Colorado at Boulder uses relatively small quantities of many different hazardous materials (flammables, corrosives, toxics, radioactive isotopes, and biohazards) in its labs, art/photographic studios and workshops, collectively this accumulation categorizes the campus as a large quantity generator. The aggregate of hazardous waste generated at CU-Boulder has drastically increased in the past 10 years. In 1989, CU generated 12,337 kilograms of hazardous waste and in 1999, 73,260 kilograms was generated. This is a 494 percent increase in 10 years. During that time, research dollars increased 139 percent—from $85.5 million in 1989 to $204.3 million in 1999.

To a certain degree, the sources of hazardous waste at CU are analogous to households within the City of Boulder. Environmental and safety initiatives must properly reflect this individual level of responsibility. Correspondingly, the requirements and obligations that come with being a large quantity generator provide CU with some opportunities and structures to better assist these goals at an institutional level.

Accordingly, both the campus community as individuals and the university as an institution are committed to seeking and employing waste minimization and pollution prevention measures to better manage the potential risks and responsibilities inherent in these activities.

As with all safety and environmental protection goals, campus-wide pollution prevention and waste minimization efforts are responsibilities shared by the entire campus community. Faculty, staff and students have already made significant, ongoing efforts in support of these goals. These developments must be further encouraged and enabled by providing clear and direct information, innovative support programs and focused expertise. Individual waste minimization and pollution prevention efforts must also be better publicized to better foster an environment of innovation and community-wide commitment.

Ongoing Projects and Accomplishments

- The lab proctor program builds a campus-wide health and safety network with local points of knowledge and expertise.
- EH&S has a mercury thermometer/instrument exchange program in which free solvent based thermometers are given out. So far, over 1000 thermometers have been replaced.
- EH&S provides free secondary containment tubs in a variety of sizes to minimize accidental releases of hazardous materials.
- EH&S Ambassadors program encourages and publicizes significant contributions made by University community members towards waste minimization, pollution prevention and safety.

- Chemical redistribution information is posted on EH&S website. Localized, informal redistribution between labs and/or shops, and department-wide efforts, such as Chemistry Stores are tremendously effective.
- EH&S and other departmental publications improve safety and knowledge of use and disposal procedures.
- Faculty, staff and students undergo training in the handling and disposal of hazardous materials.
- Department level safety committees often include hazardous materials handling instructions.
- Staff /Faculty check-out program requires proper management of hazardous materials before exiting the University.
- Safe storage cabinets are being provided to necessary areas.
- Conversion of Fine Arts and News Services photo labs to digital photo processing
- Many departments employ microscaling practices and computer modeling to help reduce hazardous waste generation.
- EH&S and the Hazardous Materials Advisory Board are conducting a feasibility study of a central chemical procurement system.
- EH&S and the Hazardous Materials Advisory Board are identifying the needs for a chemical tracking and inventory system.

Master Plan Language

- The new campus master plan addresses the importance of pollution prevention and hazardous waste minimization.

Section IV.D.1 Outdoor Air Quality

- Reduce hazardous waste generation (avoiding the need for waste disposal companies to incinerate it).

Section IV.D.3 Water Quality

- Regulate all uses on campus through the office of Environmental Health and Safety in order to avoid instances where hazardous wastes may be dumped into the waste water system.
- Label and locate storm drains appropriately to help avoid accidental spills into creeks.

Section IV.D.5 Hazardous Materials

- Minimize the production of hazardous waste through education, inventory, tracking , and intra-campus redistribution.
- Conduct on-site inspections, training and program reviews, and investigations of incidents.
- Oversee safe use of radioactive materials and radiation producing machines.
- Handle, transport, and appropriately dispose of hazardous waste materials.
- Test, detect, abate and/or dispose of materials containing asbestos and/or lead.

· Develop contingency plans and procedures.

Additional Action Steps Needed to Achieve Goals

Although many hazardous waste minimization and pollution prevention projects are currently underway, there are still opportunities for CU to further advance current programs and implement additional programs.

· Based on the feasibility study, institute a central chemical procurement system which would allow for:
    1. More permanent and detailed labeling (possibly with barcodes).
    2. Better ability to redistribute surplus chemicals
    3. Competitive prices which may result in less bulk purchasing of large quantities of chemicals when only small amounts are necessary.
    4. Information on the substitution of alternative, safer chemicals at time of purchase.
    5. Information to track and inventory hazardous materials on campus
· Further advance "Best Management Practices" already adopted by many laboratories and shops to maximize safety and minimize waste.
· Investigate the feasibility of applying an "advanced disposal fee" to discourage bulk purchasing of chemicals.
· Further advance microscaling efforts ("Microscaling" involves conducting experiments on a smaller scale thus reducing the quantity of hazardous substances use in experiments, manufacturing, and routine cleaning).
· Install new treatment options and technology at new EH&S facility which will significantly decrease hazardous waste volumes.
· Add a waste treatment specialist to the EH&S staff to run the waste treatment process and advise on waste minimization techniques.
· Reduce photographic chemical waste by utilizing new technologies and procedures.
· Establish a battery recycling program so that rechargeable (lithium, nickel-hydride etc.) batteries are recycled rather than incinerated as hazardous waste or (in the case of alkaline batteries) taken to the landfill.

Part II: Minimizing Exposure to Toxic Chemicals and Pesticides

THE VISION:

· *CU significantly reduces the use of harmful chemicals and volatile pesticides in buildings and grounds management through integrated pest management.*
· *Campus buildings provide high indoor air quality through improved ventilation and control of indoor air pollution sources.*

The Need

Chemicals and pesticides pose risk to the health and safety of humans and the environment. Pesticides can cause adverse health effects in humans, such as cancer,

neurologic disruption, birth defects, genetic alteration, reproductive harm, immune system dysfunction, endocrine disruption, and acute poisoning.

The use of many chemicals and materials containing VOCs (volatile organic compounds) decreases the quality of indoor air in the home and workplace. Chemical sources can range from pesticide sprays to off-gassing carpets to cleaners. As a result of chemical exposures, more and more people are developing chemical sensitivities and endure physical symptoms. People experience symptoms upon exposure to even low levels of chemicals, thus coining the term sick building syndrome. All campus buildings contain sources of indoor air pollutants which may cause reactions in people with chemical sensitivities.

Integrated Pest Management (IPM) is program which reduces the use and associated risk of harmful chemicals and pesticides. IPM involves:

- A coordinated decision-making and action process for managing pests in an environmentally and economically sound manner.
- Monitoring through regular and careful inspection to determine pest-injury levels.
- Record-keeping to track problems, prevent recurrences, and evaluate the results of pest-management actions.
- Combined biological, cultural, physical, mechanical and educational tactics to:
  1. minimize health, environmental, and financial risks
  2. prevent intolerable damage or annoyance, and
  3. alleviate hazard to non-target organisms.
- Use of extensive knowledge about pests, such as infestation thresholds, life cycles, environmental requirements and natural enemies, to complement and facilitate biological and other natural control of pests.
- Judicious use of least toxic chemicals only as a last resort to controlling pests in emergency situations. Priority is given to non-chemical pest management techniques, particularly those that can prevent the reoccurrence of the problem.

Integrated pest management (IPM) makes sense--both economically and environmentally. Pesticides are an expensive choice because they do not solve pest problems at the source. IPM seeks to disrupt and destroy the conditions favorable to infestations. The cost of least toxic IPM is comparable to or less than traditional pesticide-based programs. Long-term savings can be realized by eliminating the need for action in the future.

Outside pest-control firms typically do not sell true IPM services since the purpose of IPM is preventative; thus, their levels of business could be reduced over time. CU should not rely on outside contractors to control pests unless they adhere to an established campus-wide IPM policy.

The 1999 student environmental survey showed that 84% of the student body would support organic management of campus lawns, without the use of pesticides, even if this lead to the presence of more dandelions.

Current Position and Accomplishments

In recent years, CU has made great progress in moving from traditional pest management methods to less toxic methods and has significantly reduced the volumes of chemicals used to control indoor and outdoor pests on campus. For indoor pest management, pesticides are still used but their use is safer, more effective and more responsible. They are no longer applied in powder or aerosol form nor are any volatile chemicals used for indoor pest management. For outdoor pest and weed management, biological, mechanical and cultural means are the first choice rather than chemical controls.

IPM Indoors

In the Department of Housing Dining Services alone, outside contractors would spray to control pests once each week and would fog kitchens twice each year. These techniques changed in January 1998 when Housing staff decided no results were seen while over $20,000 was expended annually on pest control in dining service areas. Rocky Mountain Pest Control was contracted out to practice integrated pest management for Dining Services. With pests under control and cost savings realized, IPM has proven itself as a successful practice for Housing Dining Services. Additionally, the Department of Housing practices least-toxic IPM in Family Housing apartments and Residence Hall units through prevention and baits--not sprays.

Only a handful of buildings on campus still rely upon pesticide sprays, notably the Power House, Recreation Center, and University Memorial Center. Many pesticide applications are done by outside contractors (Ace and Abash). In the past three years, only once has Facilities Management needed to spray inside a building in the East zone of campus. In the past two years, no indoor spraying has been conducted in West zone buildings (excluding the UMC and Recreation Center).

In 1998, CU embarked on a unique experiment which employed parasitic wasps to control campus roach populations. Very small, harmless wasps were released in the steam tunnels where roaches have found the perfect habitat for breeding. The wasps prey only on roach eggs; thus, controlling the roach population at the source. What started as an experiment has been heralded as a success.

In the fall of 1999, Facilities Management hired an IPM technician to use alternatives to volatile pesticides. Baits, vacuums, sticky traps, mechanical and biological controls are all effective and safe and are now the standard in campus pest control. The cornerstone is the knowledge of the pests and their habitat for long-term prevention. The additional benefit of the IPM technician is the education of campus users. Campus users are seeing results, are satisfied with safe and healthy approaches, and are also gaining an understanding of pest prevention.

IPM Outdoors

In the past few years, outdoor spraying has happened two to three times for box elder bugs and for elm bark beetles. Aerial spraying is no longer utilized for the elm bark beetles. The elm bark beetles which cause dutch elm disease are now treated with soil injections on the highest risk trees. Sanitation pruning and selective use of plant materials also prevent pest infestations. In addition, over two tons of chemicals deemed unnecessary and/or highly toxic have been removed from campus and disposed of properly.

Facilities Management does reserve the option to use pesticides as a last resort. In the spring of 1999, outdoor spraying was used to control the worst dandelion populations (about 10 to fifteen percent of the landscape). Currently, grounds crews are employing more intensive mowing techniques rather than sprays. Alternative weed control methods, such as the application of corn meal gluten, are being utilized in test plots. In areas where dandelions are less of a problem, weeds are pulled by hand. In few areas of campus, the soil is healthy and weeds are not a problem, so treatment is not necessary.

RoundUp is the most used contact herbicide on campus grounds. Its use is generally restricted to gravel beds, sidewalk cracks and mulched areas. To further reduce the use of herbicides, Facilities Management will begin to use weed flamers to control weeds in gravel beds and sidewalk cracks.

Noxious weeds now pose a formidable problem to campus natural areas. East campus and the recently acquired Gateway property have established populations of many noxious weed species, notably diffuse knapweed, Canada and Musk thistle, leafy spurge, and yellow toadflax. To control noxious weeds, Facilities Management Grounds Division is putting together an integrated weed management proposal which will:

- Collect data, monitor and map populations
- Establish and prioritize injury levels
- Select treatment based on lifecycle factors
- Systematically prevent further invasion and then employ cultural, mechanical, biological, and chemical treatment strategies
- Utilize record-keeping and evaluation
- Educate and raise awareness of campus users

The Department of Housing also uses IPM to manage their grounds. In 1994, the use of pesticides was banned on the grounds surrounding residence halls. Aesthetics have not been compromised and residents are extremely satisfied.

Other Sources of Chemical Exposures

Campus buildings are now more often being built and maintained with products (i.e., adhesives, paints, stains, cleaners)
that contain lower levels of VOCs (volatile organic compounds). Facilities Management is identifying which of these lower-VOC products perform just as well or better than high-VOC products. The production of high-VOC products will be phased out in the near

future as directed by Federal regulations. Thus, their use will become less common. In campus construction projects, the use of low-VOC products is up to the contractor and project managers. No- and low-VOC products need to be used as a standard practice in building construction and maintenance.

Master Plan Language

Section IV.D.3 Water Quality

Continue the integrated pest management system, which helps reduce the use of pesticides in landscaping and drainage runoff.

Section IV.D.2 Indoor Air Quality

CU-Boulder will continue to implement practices and procedures that help assure indoor air quality. Guidelines:

- Locate vehicular loading areas and air intakes at separate locations in new building design.
- Use low or no VOCs materials more often.
- When possible, instigate a purging time to ventilate a new building, when possible, with outside air for a reasonable time before people move in. This will help remove airborne contaminants leftover from the construction process, and will better accommodate the initial off-gassing of VOCs.
- Increase outdoor make-up air to the extent possible and consistent with building codes, while balancing the consequences of increased energy use.

Action Steps Needed to Achieve Goals

CU has been practicing Integrated Pest Management for nearly five years. IPM is indeed proving that we can have more control over our institutional environment which results in more satisfied campus users, fewer pests, fewer problem infestations, and fewer pesticides.

It is time for CU to formally implement a complete least toxic IPM program that applies to the whole campus. To implement a strong indoor and outdoor IPM policy, we need to:

- Provide consistent and adequate funding and staff.
- Further educate campus users and visitors of efforts to reduce pesticide and chemical use.
- Eliminate the use of chemical sprays.
- Institute a decision-making structure which places least toxic pest control methods as the highest priority and reviews campus-wide pest control methods.
- Continue to manage noxious weeds with alternative methods when and where possible.

- Address and plan for IPM in Campus Building Standards.
- Eliminate use of restricted chemicals. Identify which pesticides to absolutely not use on campus and ban the use of highly toxic, unnecessary pesticides.
- Require outside pest control contractors to follow IPM policy and procedures.

To provide high indoor air quality, we need to:

- Design for improved indoor air quality. Design needs to address source control (building materials, furnishings, equipment, cleaning agents), ventilation control, occupant activity control, and building maintenance.
- Identify safe and effective alternatives to chemical cleaners for use by all campus custodial staff.
- Campus standards need to direct the use of high-performance no- or low-VOC paints, adhesives, cleaners, carpets, and wood products in new buildings, renovation of old buildings, and building maintenance as a standard choice (not as an alternative).

Measurement

In order to track the success of the IPM program, it is important to collect adequate campus-wide data, including:

- Track what pesticides are applied in what volumes
- Monitor the circumstances leading to pest occurrences and reoccurences
- Evaluate and monitor the methods used to completely eliminate pest invasions
- Account for costs of damage incurred and/or avoided

Student Support

In the fall of 1999, the Environmental Center conducted a scientific survey of student attitudes on campus environmental issues. One of the questions addressed pesticide use on campus lawns. Students overwhelmingly support the organic management of campus lawns even if it means more dandelions. 84 percent of respondents felt that CU should stop using pesticides on campus lawns.

Greening Campus Consumption and Disposal Habits

Part I: Purchasing Environmentally-Responsible Products

THE VISION: CU adopts an environmentally-preferable purchasing policy which will institute standards for environmentally responsible purchasing.

The Need

The nation's universities spend over $185 billion annually. Responsible purchasing decisions by universities can profoundly influence markets for goods and services. One

of the main impacts CU has on the natural world is through the millions of dollars that the institution spends each year on purchasing products. By carefully choosing what we buy, we can use this purchasing power to encourage the development of environmentally responsible industry, rather than inadvertently paying for harmful practices.

Numerous examples of environmentally-responsible purchasing exist around the country. An EPA survey of 90 colleges and universities in 1992, found 44 percent had active procurement programs for recycled products. California's system of higher education for instance, purchases over $5.9 million in recycled products annually.

When CU was required to comply with state legislation mandating recycled paper use, we boosted purchasing to the highest levels in the state. Over 60 percent of CU's total annual paper purchases contained recycled fiber. In 1997 however, HB 1140 expired and state agencies like CU were no longer required to buy recycled or report their annual purchases. As a result, there has been a decline in the recycled paper purchased by CU.

This trend is compounded by recent changes in CU's purchasing procedures. Initiatives like the Acquisition Card and the Administrative Streamlining Project further decentralize purchasing. This shift has made it more difficult to institute campus-wide procurement policies for environmentally responsible products and services.

Current Position and Accomplishments

Despite the lack of structured state or campus policy, CU has made noteworthy accomplishments.

- Printing and Copying Services stocks recycled paper in all copy centers and advocates for recycled content stationery for CU. They also have played an important role in collecting used toner cartridges for recycling.
- The CU Bookstore offers a variety of recycled products.
- The Distribution Center and Facilities Management Stores sell recycled paper and paper products to campus departments.
- The Transportation Center reports using re-tread tires for campus vehicles.
- The Housing department has purchased recycled plastic playground equipment for its day care facilities.
- UCSU and Housing have prohibited the posting of deep-dyed, "astrobright" papers. This policy has greatly increased the recyclability of paper at CU.
- In vendor contracts like those for soft drinks, waste reduction and recycling provisions have been included. This proactive approach will benefit CU's environmental efforts by requiring financial and operational assistance from companies doing business with CU.

Action Steps Needed to Achieve the Goal

CU should adopt an environmentally preferable purchasing policy, which will institute standards for environmentally responsible purchasing. These standards should

recommend, and in certain instances require, adherence to environmental specifications in vendor contracts, campus stores and departmental purchases. Adopting an environmental purchasing policy would reduce solid waste and pollution, cut energy consumption, and create markets for environmental goods.

These standards should specify products which are of comparable price, quality, and availability and have one or more of the following attributes:

- high post consumer content
- low embodied energy
- recyclable within CU's existing operation
- non-toxic
- energy efficient
- durable and/or repairable
- produced in an environmentally-sustainable manner

Standards should also apply to services which are contracted out, such as:

- soft drink vending
- campus mailing list purchases
- concessions
- automotive waste disposal
- food service supplies
- construction and remodeling

A new purchasing guide is needed for campus. The Recycled Products Guide, created in 1995 has become obsolete by the Acquisition Card, Administrative Streamlining Project, and personnel changes in Buying and Contracting. A new guide will require research about price, quality, and availability of recycled products. It should also detail how CU's new purchasing procedures can be used to buy more environmentally responsible products and services. This guide could be the cornerstone of a new campus policy and serve as a principle means of educating the campus community, provided there is administrative commitment to the project.

To make the campus-wide effort to purchase environmentally responsible products, we need to:

Research commonly purchased products and services.
Research which vendor contracts could be revised to include environmentally-responsible specifications.
Research price, quality and availability of environmentally-preferable alternatives.
Create a policy directive from CU-Boulder Administration which recommends and/or requires certain products, services, and campus practices to become "greener."
Publish a purchasing guide which includes products, services, and campus procedures.
Educate the campus community by e-mail and distribution of guide to departments.

Inform campus suppliers of environmental improvements needed through a request for information (RFI) document.
Adopt reporting requirements which allow the campus to track progress and identify areas for improvement.

Part II: Capping Solid Waste Going to the Landfill at Today's Levels

THE VISION: As CU grows, we will cap the amount of solid waste going to the landfill at today's volumes by increasing recycling and composting efforts and by using market incentives, new technologies, and purchasing policies to reduce waste generation on campus.

To attain this goal, CU needs to commit to fully developing:

- A convenient, cost-effective recycling and composting operation which diverts at least sixty percent of the campus waste stream
- Waste minimization efforts which contain rising solid waste generation on campus
- Education and outreach programs which instill sound consumption and recycling behaviors at the individual and institutional level.

Overview of Ongoing Projects and Accomplishments

Established in 1976, CU Recycling has become one of the leading campus recycling programs in the country. Its mission is to divert recyclables from the waste stream cost-effectively while promoting the benefits of recycling and resource conservation and providing opportunities for meaningful student involvement. In 1991, a partnership for recycling operations was formed between UCSU and Administration. UCSU (student government) is responsible for conducting procedural training and promotions, processing of recyclables, and overseeing contracts for marketing recyclables. Facilities Management, an administrative department, is responsible for collection of deskside containers, collection of central containers, and identifying and upgrading collection sites. The partnership is directed by the Chancellor's Solid Waste Advisory Board (SWAB) which is comprised of students, faculty, staff, and administrators. SWAB also guides CU's waste reduction, procurement, and research efforts.

Existing Recycling and Composting Operations

- Six grades of paper as well as one co-mingled container grade totalling over 1,150 tons each year.
- Materials are collected from 9,500 deskside and 550 central locations.
- Facilities Management composts over 200 cubic yards of grounds waste.
- Facilities Management recovers an estimated 90 percent of scrap metal for recycling.
- Over 20 cubic yards of reusable clothing, books, and appliances are collected from the residence halls and donated to local civic groups for resale.

· Planning and designing for recycling in new construction and renovation projects Recycling of special materials (toner cartridges, transparencies, diskettes and tyvek envelopes).

Current Waste Minimization Efforts

· Some progress on revising vendor contracts for soft drinks, concessions, and food service supplies.
· Discussion of establishing more stringent conditions for commercial solicitation on campus and sale of campus mailing lists.
· Many departments and individuals undertaken waste reduction efforts. Some examples include the Chemistry Department which re-uses one-sided paper reclaimed from the recycling facility for test-taking notes and Printing Services which has invested in a docu-tech machine to produce documents on-demand and reduce the volume of overruns.

Current On-Campus Outreach Programs

· Incoming student and staff orientations and printed information.
· In-office waste reduction and recycling workshops and residence hall seminar programs.
· Special event recycling for athletic events, fairs and concerts.
· Signage, ads and displays.

Current Trends

CU already has the elements of a successful recycling program in place: strong student support, sound marketing ability, efficient collections and processing operations, and a receptive administration. From this base, CU has created a largely effective waste management and recycling program.

CU's recycling program has made incremental progress since the Student-Administration partnership was formed in 1990. Facilities Management and UCSU’s funding commitments have remained strong since the Student-Administration Partnership became operational in 1993. This trend must continue for recycling to remain successful at CU. As importantly however, other departments associated with academics, residence life, food services, and purchasing need to increase their involvement in such areas as policy creation, contract revision, coursework, capital investment, and discretionary funding.

In the 1998-99 academic year, CU-Boulder recycled 1,116 tons of materials and sent 2,750 tons of solid waste to the landfill. (However, significant sources of solid waste are not included in this estimate. See "Measurement and Tracking" discussion for details.) Based on these numbers, the campus community currently diverts approximately 29 percent of its waste through recycling, yet we have the ability to recover 55 to 60 percent of waste for recycling campus-wide. To achieve a cap on the amount of unrecovered campus waste at 1998-99 levels, measures to reduce waste and increase recycling

would be most effective if directed at the campus zones with the lowest recovery rates. In 1998-99, the Department of Housing recycled 12 percent of its total waste; whereas, academic and administrative buildings recycled 52 percent of their total waste.

Moreover, waste generation and recycling rates are expected to increase as a result of additional enrollment and new campus buildings. Campus efforts need to focus not only increasing recycling, but also on minimizing the amount of waste produced in the first place.

The program is unable to keep up with student interest. Results of a recent survey show strong support for expanded recycling services. Students also want to see more research and service learning opportunities created for them.

While there may ultimately be a reduction of paper use due to new technology, there is little evidence that this has happened to date. Unfortunately, there is at least anecdotal evidence that suggests that the conversion to ASP may have substantially increased the use of paper for administrative purposes. In addition, the availability of free printing on campus encourages students to print even large documents off the web. Also, many departments produce more documents than are necessary. Although these over-runs are usually recycled, departments need to make efforts to more accurately determine required quantities prior to production as over 13 tons of over-runs were processed for recycling last year alone.

Tipping fees for landfill disposal are projected to increase statewide as private companies raise rates to remain profitable. This trend will favorably affect recycling's appeal. Although, in the near-term, it is doubtful tipping fees for CU will reach the U.S. average of $60 per ton--a rate which has fueled recycling nationwide. Currently, CU enjoys a low $20 per ton rate from Western Disposal.

As a result of these recent trends, CU's status as one of the nation's leading campus recycling program is in jeopardy. An estimated 2,700 campus recycling programs are currently in operation around the country. A growing number of schools are investing in recycling's potential and, as a result, are developing innovative programs and posting high recycling rates. For many students and campus leaders, CU's status as the leader in campus recycling is an important distinction. Maintaining it will involve greater commitment to recycling and waste reduction than is currently provided.

Master Plan Language

The Campus Master Plan maintains that waste reduction and recycling efforts are a priority for CU-Boulder.

Reduce the waste for which the campus must pay removal costs. (Section IV.D.8)

Guidelines

- Decrease waste generation.
- Increase convenience of diverting recyclables.
- Integrate recycling when new facilities and major renovations occur.
- Recycle and minimize waste in construction projects.
- Continue to replace trash-only containers (indoors and outdoors) with solid waste stations for both trash and recyclables.

Action Steps Needed to Achieve Goals

Beginning in 1998, CU Recycling gathered input as to what we need to do to reach our full recycling and waste management potential. CU Recycling conducted surveys of students and off-campus agencies. The Solid Waste Advisory Board held planning retreats. The recycling director also researched emerging trends and technologies in the recycling industry. Based upon this information, the student-administrative partnership for recycling has developed a vision for the next generation of recycling improvements at CU Boulder.

Expanded Recycling and Composting Operations

Sixty percent diversion is an attainable goal. To reach it, a number of improvements must be made to the existing recycling program.

The following measures are planned for implementation during Fiscal Year 2000-2001:

- Placement of solid waste management stations (combined trash & recycling containers)
- Automated cardboard collection program, specifically in Housing
- Additional classroom recycling containers Improved outreach materials on proper recycling (i.e., displays, guides)

Additional recycling improvements are necessary in the next few years. These should include:

- Recycling bins for Family Housing apartment Central outdoor recycling stations on main campus.
- Textbook recycling
- Vermi-composting of food waste generated by Housing Dining Services and the UMC
- Computer and electronics recovery
- Placement of an automated cardboard compactor at the UMC
- Expanded grounds waste composting to include Housing
- Additional magazine and catalog recycling locations

The expanded recycling efforts will inevitably require increased capacity at the campus recycling facility. Plans are currently underway to relocate the

IPF (Intermediate Processing Facility).

The relocation of the IPF needs to account for these expansions.

Future Waste Minimization Efforts

CU's waste generation is expected to increase as a result of rising enrollment and additional buildings. Several initiatives can be used to decrease the amount of waste generated at CU. These include:

- Revising vendor contracts for soft drinks, concessions, and food service supplies
- Establishing more stringent conditions for commercial solicitation on campus and sale of campus mailing lists
- Promoting waste reduction technologies and financial incentives for communication and printing
- Instituting a waste abatement mini-grant program which would provide financial assistance for innovations and development of waste reduction products and processes
- Establishing a program to collect and redistribute reusable office supplies among CU offices and student groups
- Adopting campus building standards to recover and minimize waste generated by campus construction and renovation projects.

Improved Outreach

Although there is strong support for the campus recycling program, participation needs to be extended beyond the collection program. Getting the campus community more actively involved in waste reduction and environmentally-responsible purchasing will require the following outreach activities:

- Improved signage and displays
- Updated and expanded recycling guide
- Increased media presence
- Improved/expanded incoming student and new employee orientations
- Updated "Green Purchasing" guide (see previous section)

Measurement and Tracking

To measure progress toward the goal of capping waste at 1998-99 levels, we need to:

- Define what constitutes the campus' solid waste stream. In 1998-99, 2750 tons of waste generated were landfilled. This amount includes waste from all academic and administrative buildings and residence halls. However, it does not include waste volumes from significant campus generators, such as the University Memorial Center

(estimated at 240 tons in 1998-99), grounds (estimated at 187 tons in 1998-99), residence halls move-out, Distribution Center, and construction projects. Additionally, the 1116 tons of recovered waste in 1998-99 do not include grounds waste composting or scrap metal recycling.

- More accurately determine and track waste and recycling volumes based on the above definition.