

# State of the Environment Report



April 2002





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Solid Waste Services  
Water and Wastewater  
Watershed Protection and Development Review

Cover photo by Mike Lyday, Watershed Protection and Development Review Department

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## **Executive Summary**

On June 16, 1996, the City Council approved an ordinance directing the City Manager to appoint an Environmental Officer to ensure that environmental protection is given the highest priority, and to produce an annual report regarding the state of Austin's environment. This seventh annual report addresses the state of our environment using the following environmental indicators: watershed protection, air quality, solid waste and hazardous waste disposal, water supply and conservation and wastewater service, open spaces and parkland, and energy consumption and conservation.

### ***Watershed Protection***

Like many rapidly growing cities, Austin faces the challenge of minimizing water pollution at a time of increasing development. A city with little industry, many of our educational efforts are focused on non-point source pollution, created by homeowners. Many of our monitoring efforts indicate that nitrates are elevated in much of our groundwater, with springs in developed areas showing six times the level of nitrates as those in undeveloped regions. Pesticides have been found in the venerated Barton Springs for the first time, a harbinger that protection efforts must be increased to safeguard the endangered Barton Springs salamander. The reduction of landscaping chemicals has thus become an essential component of the educational strategy.

As Austin faces increased urbanization, the City's Watershed Protection and Development Review Department and Texas Cooperative Extension launched the new program, Grow Green, to bring citizens and participating gardening retailers information about environmentally-responsible alternatives for their landscaping needs. Recognizing that pollution from rainfall runoff is a major threat to our creeks, lakes and aquifer, Grow Green stresses careful problem identification and physical, biological, or least toxic options for controlling pests and diseases and fertilizing lawns.

Other issues covered under Watershed Protection include information on several watershed program initiatives, and summaries of significant watershed issues, including a characterization of the November 15, 2001 storm event, where as much as 14 inches of rainfall was produced during the period of November 14-16. High intensity rainfall in parts of the area caused flooding in some streams in the Colorado and Guadalupe River Basins. The Austin American Statesman reports that 9 people drowned area-wide during the floods. One flood related drowning fatality occurred within the Austin City Limits.

### ***Air Quality***

Air quality in the Austin-San Marcos Metropolitan Statistical Area (MSA) (Bastrop, Caldwell, Hays, Travis, and Williamson counties) is threatened and area residents are at risk for corresponding negative impacts on aesthetics and health. In 1999, the amounts of ground-level ozone recorded at regional monitoring sites exceeded the maximum amount allowed under the proposed ground-level ozone standard of the Federal Clean Air Act. For violating this standard, the region could be subject to a nonattainment designation by the U.S. Environmental Protection Agency when final rulemaking is complete.

Clean air is a vital aspect of the quality of life in the Austin region, and air quality statistics impact Austin's reputation for "livability". Poor air quality creates aesthetic concerns such as reduced visibility and an unsightly green or brown haze. It damages property including buildings, vehicles, and flora. Most importantly, air pollution is a health hazard, especially for the very young, athletes who exercise outdoors, and the elderly.

### ***Solid Waste/Hazardous Waste Disposal***

The city of Austin began collecting household hazardous waste (HHW) at annual collection events in 1986. On January 4, 2000, the program moved into its new facility at 2514 Business Center Drive and implemented a twice-weekly collection schedule (Tuesdays and Wednesdays, 12:00 p.m. to 7:00 p.m.). During fiscal year 2000/2001 this

program serviced 6773 households and diverted 757,510 pounds of household hazardous waste.

If this waste were not collected, it would remain in people's homes or be discarded with the risk of injury and/or pollution through the solid waste stream, wastewater, or even storm sewer. The City's HHW Program has serviced over 66,000 households and collected over 4.7 million pounds of household hazardous waste for recycling or proper disposal since the program's inception in 1986. Not only has the program safely diverted hazardous waste from improper dumping, the landfill and wastewater systems, but it had substantially increased the safety of solid waste workers who may be exposed to such chemicals during garbage collection or at the landfill.

### ***Water Supply and Conservation, and Wastewater Service***

Water consumption in the Austin area has steadily increased over the years due to consistent growth in the entire Central Texas region. The City of Austin's water utility supplies water within the City and to a number of surrounding areas. The size of the utility's service area continues to grow, and even the existing service area could accommodate substantial population growth for decades in the future.

In October 1999, the City of Austin supplemented its ample state-adjudicated water rights with additional water reserves purchased from the Lower Colorado River Authority (LCRA) through a new water supply agreement. These combined supplies, backed by firm storage in the Highland Lakes, in conjunction with water reclamation and conservation are expected to meet demands for raw water within Austin's service area through the next 50 years.

## ***Open Space and Parkland***

In December of 2001, City Council approved management plans for Water Quality Protection Lands. These plans prescribe actions to be taken to manage this land in a manner that will provide optimum levels of clean high quality water as part of the City's water supply. The management plans approved by City Council also include recommendations to accommodate public access on the land. The recommendations provide for trails and education events that will allow the public to learn about the land and how it is being managed.

Open space is an excellent indicator of Austin's commitment to the natural environment and to the health and well being of its citizens. Austin has a long and favorable history of maintaining and preserving open spaces that provide citizens with many opportunities to enjoy a variety of outdoor activities, including facilities for swimming, hiking, biking, picnicking and nature observation. The ratio of parkland per 1000 citizens is 24 acres – about the same ration that existed in 1985.

## ***Energy Consumption/Conservation***

The Conservation, Renewables and Environmental Policy Division, formerly Austin Energy Services, offers customers energy efficiency and energy management services. The programs provide technical advice and information, and through financial incentives, encourage customers to use energy efficiency measures and provide energy-saving products and services including free weatherization to low-income households.

The purpose of these programs is to save energy through efficiency while increasing customer satisfaction by reducing electric bills and using energy resources responsibly. When energy is used more efficiently, power plants emissions are reduced and costs decrease for Austin Energy and its customers.

The Austin Energy Green Building Program continues to be a national leader in the area of sustainable commercial and residential building. The program was the first program in

the country to offer a sustainability rating. It is a measure of a building's environmental impact in terms of energy, water and resource efficiency. The Program was one of the twelve winners—the only one in the United States—of a United Nations Award for environmental initiatives at the 1992 Earth Summit in Rio de Janeiro.

In 2001 the work of the Green Building Program resulted in the conservation of 12,044 megawatt hours of electricity. This translates into a reduction of 10,238 tons of Carbon Dioxide, 39 tons of Sulfur Dioxide and 17 tons of Nitrous Oxides in the release of these pollutants.

## **Section 1**

### **Watershed Protection**

#### ***Various Watershed Protection Program Efforts***

##### **Green Gardening Initiative**

On May 3, 2001, City Council asked staff to assess City programs that promote environmentally-sound landscaping practices and to evaluate its own practices on City property to ensure that the City is a leader in implementing earthwise gardening options. A requested Benchmarking Study provided comparative information on other government-sponsored programs and found Austin to be in the forefront in its educational outreach, but with room for improvement.

The later-named Green Gardening Initiative also included a series of landscaping summits that involved representatives from City departments and stakeholders from the community. Nearly 100 people attended one or more of the nine meetings that discussed gaps in existing City services and how to best transition to a “green gardening culture”. Breakout sessions took place with representatives from nurseries/retail outlets, builders, pest management professionals, landscape professionals, the general public, City landscape maintenance professionals, regulatory groups, and an education task group.

A report includes input from the landscaping summit and the seven City departments who are currently engaged in the education of “earth-wise” landscaping principles or the installation and maintenance of City landscapes. The report includes an implementation plan for the enhancement of those programs and the development of new programs if appropriate.

To date, one of the major benefits of the Green Gardening Initiative has been the improved internal communication. A Green Gardening Network was established with education and technical staff from six City departments participating. Their mission is to

coordinate an “umbrella” for the City of Austin’s landscaping programs so that the community has one educational source for environmentally sound gardening solutions. Meetings take place monthly and projects include the revision of the four existing City Plant Lists to provide greater consistency and offer more native and adapted plant options. Also the group is sponsoring a consolidated educational component at the Zilker Botanical Garden Festival that attracts 16,000 visitors. City staff will man six booths and provide speakers throughout the weekend on earth-wise gardening topics. Green Garden brochures, signage and informational packets have been produced and a website set up at [www.cityofaustin.org/watershed/ggidefault.htm](http://www.cityofaustin.org/watershed/ggidefault.htm)

Also a new demonstration Garden, the Green Garden, has been installed at the Zilker Botanical Gardens to provide exposure to environmentally-sound landscaping principles. Nine area designers participated and all plants are native or adapted to the Austin area. Signage and an educational kiosk have been added.

Major contributions have also been made throughout the community. The Texas Cooperative Extension is producing two, 20 minute training videos for the Grow Green program (the water quality education component of Green Gardening) for a minimal coordination fee. The Lady Bird Johnson National Wildflower Center recognized Grow Green as a partner in its native plant publication and a group of landscape designers produced six design templates for homeowner use that will be incorporated into the Initiative. Stratus Properties, a local home builder, will feature a Green Garden at the 2002 Women’s Symphony League of Austin Designer Showhouse with 20,000 people expected to attend the two week long home tour. The Texas Structural Pest Control Board has also submitted a proposal to the Environmental Protection Agency requesting funding to perform quarterly pesticide monitoring at four local springs chosen by the City to better understand the impacts of pesticide use throughout Austin.

The City also initiated a cooperative project between landscapers, growers and nurseries to encourage increased production and promotion of native and Austin-hardy plants. Forty people are participating in the project and to date have helped select Plants of the

Week to be promoted in the newspaper and at the nurseries and also refined the Grow Green Plant List to include issues of availability and suitability.

The Green Gardening Initiative recognizes that every landowner can play a part in environmental protection through sound landscaping practices. By consolidating efforts and providing “one-stop shopping” for the City’s programs and rebates, the hope is to make earth-wise landscaping valuable and accessible for Austin’s citizens.

### Spills and Complaints Response

The City of Austin Spills and Complaints Response Program (SCRP) within the Watershed Protection and Development Review Department responds to hazardous and non-hazardous material spills to minimize surface water and stormwater pollution. In addition, SCRP staff investigates citizen pollution complaints. Response and investigation are within the City of Austin limits and the five-mile extraterritorial jurisdiction. This program prevents or minimizes potentially polluting discharges to Austin’s creeks and lakes, often reducing or eliminating the threats to life and property at the same time.

Investigators are on-call to respond to incidents 24 hours a day through the City’s Environmental Hotline to ensure quick response. In some cases, investigators respond with the Austin Fire Department (AFD). SCRP staff addresses environmental threats, while AFD addresses threats to human life and property. Investigators assess the environmental impact, determine the responsible party, identify the pollutant(s), and ensure proper clean up and implementation of preventive measures by the responsible party. SCRP investigators do not perform the clean-ups but provide expertise in environmental regulation; environmental protection and pollution clean up. SCRP staff request and review sample results and remediation plans when needed, advise on all applicable environmental regulations, and develop/provide educational materials. In the case of spills that do not present an immediate threat to life or property, program staff is generally the first and only responder and directs the responsible party in the clean up process. Enforcement action is taken when necessary to gain compliance.

Beginning in 1987, when the SCRCP was created, and through October 31, 2001, the Spills and Complaints Response Team has performed 14,923 pollution investigations. In FY 00-01, the SCRCP staff conducted 1720 investigations throughout the City and its five-mile extraterritorial jurisdiction. This was an increase of 320 investigations over the prior fiscal year.

Investigations are classified as priority or non-priority. Priority calls are those identified as posing an immediate threat to water quality and the response time goal is 45 minutes or less. The average response time for FY 00-01 was 38 minutes. Non-priority calls are those that do not appear to pose an immediate water quality threat and the response time goal is within 24 hours. The average response time for non-priority calls in FY 00-01 was 8.9 hours. In 2001, SCRCP investigators responded to 913 priority incidents and 807 non-priority incidents and oversaw the removal of 1,328,813 gallons and 601 cubic yards of pollutants from the environment, up from 1,174,939 gallons and 530 cubic yards of pollutants in 2000. The increase in the amount of pollutants recovered reflects the increased cooperation from City departments and other agencies, combined with prompt notification of spill events, both from the public and the responsible parties.

### Stormwater Discharge Permits

Stormwater Discharge Permit Program (SDPP) staff conducts inspections of, and issues permits to, specific commercial and industrial operations within the City limits to prevent or minimize polluting discharges to City storm sewers and waterways. Site inspections are conducted to evaluate waste storage, handling, and disposal practices, maintenance practices, and the operational condition of water quality controls (stormwater ponds, area drains, oil/grit traps, etc.). Inspectors also identify and ensure correction of illegal plumbing connections to the City storm sewer system and receiving waterways, identify and ensure cleanup of surface contamination, request and review sample results and remediation plans as needed, and develop/provide educational materials for business owners and operators. In addition, advice is given on corrective actions, applicable

regulations, pollutant testing, remediation technology options and pollution prevention strategies. Enforcement action is taken when necessary to gain compliance.

Stormwater Discharge Permits are issued to facilities on an annual basis. In FY 00-01, the program issued 1,250 permits. The program inspected 699 of these businesses (renewal and new facilities) for compliance in FY00-01. As a result of these inspections, approximately 49 cubic yards of contaminated solids (oil-contaminated soil, used sorbent material, etc.) and 4,552 gallons of contaminated liquids (used motor oil, solvent, antifreeze, etc.) were removed from the environment.

Program staff routinely conducts follow-up inspections of facilities in order to achieve 100% compliance. However, staff has recognized a steady decrease in the number of facilities requiring a follow-up visit. For FY 00-01, previously inspected facilities had a 59% higher compliance rate than those facilities that were inspected for the first time, clearly demonstrating the success of the program's educational efforts for business operators.

One of the most significant projects SDPP staff has developed is the Austin Clean Water Partners. This project recognizes businesses for their efforts to protect Austin's valuable water resources. In FY 00-01, SDPP staff increased facility enrollment in the program by 15 participants. Total participation at the end of 2001 was 50. To qualify for the program, participants are required to meet five criteria that go "above and beyond" the regulatory requirements. Once the criteria are met, participants are recognized through radio spots, printed ads and other media coverage. In addition, they receive a clean shop banner, window sticker, employee training handbook and poster, as well as other items. Customers of these businesses will now be able to recognize them as a "clean shop" that is working in partnership with the City to protect water quality.

## Flood Hazard Mitigation Program

The purpose of the Flood Hazard Mitigation program is to reduce the impacts of flooding on our community in order to protect lives, property and the environment. Several activities comprise this program, including mitigation of both creek flooding and localized storm drain flooding, regional stormwater management evaluation, voluntary floodplain home buyout, floodplain management, and the flood early warning system. Program accomplishments are summarized by watershed:

### Bull Creek

- 42 acres of greenbelt was returned as part of preserve land.
- Prevented construction of 105 town homes immediately adjacent to the creek.

### Onion Creek:

- 34 homes purchased through Voluntary Home Buyout Activities to date, approximately eight acres returned to greenbelt

### Onion and Williamson Creek Watersheds

- The U.S. Army Corps of Engineers Preliminary Feasibility Study, Phase One for Flood Hazard Improvements is nearing completion. Phase One will provide a report on the preliminary findings for structural improvements, home buyouts and other economically and environmentally feasible improvements to reduce the hazards of flooding in the lower portion of Williamson and the Onion Creek Watershed area within the City of Austin and Travis County.
- Completed voluntary home buyouts on Meadowcreek Circle and the Creek Bend areas of Williamson Creek. Approximately five acres have been returned to greenbelt.

### Little Walnut Creek

- Phase One Construction of local storm drainage improvements in the Crystalbrook Subdivision will begin late Spring 2002.

## Streambank Restoration and Erosion Management Program

The issue of Streambank Erosion and the rates at which it has escalated since the October April 2002

1998 storm in the City’s creeks and streambanks is a constant challenge. Using innovative bio-revetment techniques to restore the banks to a natural state has been our goal. Over the past four years The City of Austin Erosion Program has been recognized by groups such as the US Army Corps of Engineers as one of the leaders in the U.S. in the area of stream channel restoration. The stabilization methods and techniques initiated in our projects have also been honored by the International Erosion Control Association.

## Watershed Protection Master Plan Implementation

### Overview

The mission of the Watershed Protection Department (WPD) is to reduce the impact of flooding, erosion and water pollution on our community in order to protect lives, property and the environment. To accomplish this mission, WPD completed Phase I of a Watershed Protection Master Plan to better prioritize service needs and refine program direction.

The Master Plan inventories existing watershed problems and gauges the impact of future urbanization in seventeen (17) watersheds – including all of the urban watersheds and five surrounding non-urban watersheds:

<u>Urban</u>		<u>NonUrban</u>
Blunn (BLU)	Johnson (JOH)	Barton (BAR)
Boggy (BOG)	Little Walnut (LWA)	Bull (BUL)
Buttermilk (BMK)	Shoal (SHL)	Country Club (CNT)
East Bouldin (EBO)	Tannehill (TAN)	Walnut (WLN)
Fort Branch (FOR)	Waller (WLR)	Williamson (WMS)
Harper’s Branch (HRP)	West Bouldin (WBO)	

Phase I studies helped to locate and prioritize problem areas where watershed protection goals and objectives are not currently being met or are not expected to be met in the future. These studies are categorized by mission as creek flooding, localized flooding, streambank erosion and water quality degradation. Integrated problem areas were determined by overlaying the results of the individual mission studies to identify areas of

concurrent flooding, erosion and water quality problems. Integrated problem areas demonstrate an increased need for multi-purpose solutions.

In June 2000 City Council adopted the Watershed Protection Phase 1 Master Plan. Successful implementation of proposed watershed solutions relies heavily on public input and support. A public hearing sponsored by the Environmental Board and the Citizens Advisory Group was held in February 2001 to present the Master Plan findings and recommendations, and to obtain public input. All City of Austin Boards and Commissions were provided information summarizing the WPD Master Plan findings and recommendations. Boards and Commissions that oversee aspects of City government where opportunities for partnership on projects, such as the Water and Wastewater Commission, the Parks Board, and the Planning Commission were given a presentation of WPD Master Plan findings and recommendations.

In the future, capital projects and program enhancements will be implemented as funding is approved through the annual budgeting process, special bond elections, or other funding allocations. Both a short-term and a long-term implementation plan will be developed once such funding decisions are made. Regulatory changes will proceed through the appropriate public input process for development of final language, and then through the public review and adoption process.

#### Capital Projects

Assuming that funding is available, policy decisions must be made regarding the implementation of capital projects. Different prioritization processes were reviewed during the course of this Master Plan. Several included ranking factors such as cost-benefit, sustainability and neighborhood impacts. Ultimately, a “needs-based” approach was selected (with the support of the Citizens Advisory Group) to prioritize WPD recommendations for future project funding. A needs-based approach simply means that the worst problem areas [where the needs (risks) are greatest] will be considered first for project implementation.

Problem area severity ratings for the flood, erosion, water quality and integrated problem missions form the basis for the priority designation for capital project implementation. Often, the projects that will fix these “worst” problem areas are very expensive. Final implementation decisions will have to consider available resources. Some high priority but costly solutions may have to be delayed if funds are not available. This may result in less expensive lower priority projects being implemented first based on availability of funds. Project implementation is also affected by the source of the funding. Certain sources of revenue, such as RSMP or the urban water quality fund are targeted for specific missions and are limited geographically as to where their revenues can be spent. Still other projects may proceed based on “opportunity” considerations where land donations, grant funding, or cost sharing with other City projects reduces project cost.

A major tenet of this Master plan is to implement sustainable watershed protection strategies that integrate the flood, erosion and water quality missions. Past project experience has shown that “single mission” project planning strategies are more costly than multipurpose, integrated strategies. Integrated multi-mission projects also have greater benefits than do single mission, and can be better planned by including all components of a solution that affect its overall performance and sustainability. Single mission planning and implementation commonly creates unanticipated impacts on other missions. Ideally, multi-purpose integrated projects are designed concurrently to avoid project conflicts and enhance watershed benefits.

Determining the cumulative impact of implementing several multi-objective projects in the same watershed is very complex. Understanding the synergistic impact that projects have on each other is also very complex. These are, however, key elements necessary to proper long term watershed management planning. An understanding of stream dynamics is also necessary to optimize project benefits. Stream dynamics impact the way a creek responds to a given drainage improvement, including controls placed in a creek, channel improvements or construction done within or adjacent to a creek. An understanding of the long-term consequences of a project on a creek system is necessary to design and implement sustainable projects. For these reasons, WPD chose to use a

watershed management area (WMA) approach for solution implementation. The WMA approach provides an improved basis for the development of comprehensive, coordinated watershed management plans.

This WMA system is based on the classification of creek segments or reaches into three categories (Table 1-1) based on the predictions of how the creek will respond to given drainage improvements (Chan, 1997). These three categories support a stream management approach that provides a watershed-scale perspective on the development of restoration programs. While the WMA concept considers the entire watershed, it allows for integration on a smaller project-scale basis. Watershed Management Areas were designated to encompass given reaches of a creek based on similar reaches. Following a systematic procedure to group similar reaches of the creek allows for better planned and integrated CIP solutions – designing and implementing them concurrently as a comprehensive strategy, rather than individually. This WMA approach will minimize the negative impacts of one project on another and will allow coordination of nearby projects to avoid conflict and minimize cost.

**Table 1-1  
Watershed Management Area Approach**

<b>Classification</b>	<b>Management Approach</b>
<b>Type A</b>	Type A restoration involves specific reaches or lengths of the creek where the stabilization work can be implemented in isolation of upstream or downstream creek morphology; in other words, work done in one reach does not impact other reaches.
<b>Type B</b>	Type B restoration programs involve two or more reaches of the creek where work done in one reach affects or impact other reaches of the creek.
<b>Type C</b>	Type C restoration programs involve watershed-wide stabilization schemes because work done in any reach has impacts across the entire watershed.

*Source: Raymond Chan & Associates, 1997*

The WMA process did not guide storm drain improvement priorities since the majority of localized flooding occurs in areas beyond the boundaries of creek corridors. There will be a greater demand for adequate drainage as in-fill and redevelopment occurs in the

urban core. As of spring 2000, WPD identified more than 420 problem areas in the Phase I watersheds needing upgrades as a result of inadequate capacity. Each localized flooding area requires further study to better determine potential integration opportunities and relative problem severity.

The needs-based prioritization system, as defined earlier, was applied to these larger watershed management areas. Five varying levels (or tiers) of problems were identified to prioritize each Watershed Management Area: Very Low, Low, Moderate, High and Very High. Table 1-2 shows the WMA designations for each watershed, along with the WMA selection approach based on creek characteristics and the tier ratings. Figures 1-1 through 1-4 graphically show the resulting prioritization of Watershed Management Areas into the five tiers identified above, based on highest problem severity score for each mission within each Watershed Management Area.

Allotment of funding for CIP projects based on the priority WMA Tier system began in the capital budget planning process in spring of 2001. Due to the limited budget available for transfer to capital projects, only one WMA received funding for FY 2001/2002. Funding was allotted for FOR-1, located from the confluence of Fort Branch with Boggy Creek, upstream to the Manor Road crossing. The allotted funding will allow preliminary engineering and design to proceed for solution concepts identified in that WMA. The funding for FOR-1 will also allow for integration of an existing flood and erosion CIP project currently underway, providing additional water quality benefits not included in the original design.

A multi-disciplinary team will be necessary during the design and construction phase of implementation to bring together an understanding of the impacts a particular solution has on each watershed mission (Flood, Erosion, Water Quality). An integrated approach during design is essential to the success of future integrated solutions.

Finding a balance to fixing current problems and preventing future problems is essential to meeting the WPD goals. Regulations alone cannot prevent all future problems. As a

**Table 1-2  
WMA Description and Tier Ratings**

Watershed	Watershed Management Area	Description	WMA Approach	WMA Tier Rating <sup>(1)</sup>			
				EC	FC	WQ	INT
BAR	1	Main Stem from Station 0 to Station 32120	C	5	5	3	4
BAR	2	Main Stem from Station 32120 to Station 264275	C	5	5	1	3
BLU	1	Main Stem from Station 0 to Station 2680	B	4	4	4	4
BLU	2	Main Stem from Station 2680 to Station 4330	A	4	4	4	4
BLU	3	Main Stem from Station 4330 to Station 12850	A, B	3	4	3	4
BMK	1	Main Stem from Station 0 to Station 8870	A, B	3	4	4	4
BMK	2	Main Stem from Station 8870 to 12265	A, B	5	4	2	3
BOG	1	Main Stem from Station 0 to Station 8140	B	3	3	4	3
BOG	2	Main Stem from Station 8140 to Station 19600	A	5	4	4	4
BOG	3	Main Stem from Station 19600 to Station 36660	A, B	1	2	4	3
BUL	1	Main Stem from Station 0 to Station 21280	A, C	5	1	1	3
BUL	2	Tributary 2 of Bull Creek	B, C	1	4	1	2
BUL	3	Main Stem from Station 21280 to Station 42880 plus Tributary 3	C	1	2	1	1
BUL	4	Main Stem from Station 42880 to Station 59735 plus Tributaries 4, 5, 6, 7, and 8	A, B, C	3	4	1	3
CNT	1	Main Stem from Station 0 to Station 12680 plus Tributaries 2 and 3	B	1	3	5	3
CNT	2	Main Stem from Station 12680 to Station 18860 plus Tributaries 4 and 5	C	1	4	5	4
CNT	3	Old Main Stem including Tributary 1	A, B, C	3	4	1	2
EBO	1	Main Stem from Station 0 to Station 6040	A	2	4	4	3
EBO	2	Main Stem from Station 6040 to Station 10131	A	2	4	4	3
EBO	3	Main Stem from Station 10131 to Station 17957	B	2	4	1	2
FOR	1	Main Stem from Station 0 to Station 19750	A, B	1	1	4	2
FOR	2	Main Stem from Station 19750 to Station 24210	A, B	1	3	4	3
FOR	3	Tributary 1 of Fort Branch	B	4	4	4	4
FOR	4	Main Stem from Station 24210 to Station 29310	A	5	3	3	4

Notes: (1) Tier 1 = Very High Problem Area, Tier 5 = Very Low Problem Area

**Table 1-2 continued**  
**WMA Description and Tier Ratings**

Watershed	Watershed Management Area	Description	WMA Approach	WMA Tier Rating <sup>(1)</sup>			
				EC	FC	WQ	INT
HRP	1	Main Stem plus Tributary 1	A, B	5	4	3	4
JOH	1	Main Stem from Station 0 to Station 4120	B	4	4	2	3
JOH	2	Possum Trot Tributary	A	5	4	2	4
JOH	3	Main Stem from Station 4120 to Station 12650	A	5	4	2	4
LWA	1	Main Stem from Station 0 to Station 13530	B	4	3	4	4
LWA	2	Main Stem from Station 13530 to Station 15985	A	5	4	4	4
LWA	3	Main Stem from Station 15985 to Station 21580	A	5	4	5	5
LWA	4	Main Stem from Station 21580 to Station 32680	B	4	3	4	4
LWA	5	Tributary 2 (plus it's Tributary 1) plus Tributaries 4 and 5	B	5	3	5	4
LWA	6	Main Stem from Station 32680 to Station 36000 plus Quali Creek Branch and Tributary 6	C	4	3	4	4
LWA	7	Main Stem from Station 36000 to Station 47210 plus Tributary 7	C	1	1	4	2
SHL	1	Main Stem from Station 0 to Station 14670	A,B	3	1	3	2
SHL	2	Main Stem from Station 14670 to Station 25960	A,B	4	4	4	4
SHL	3	Main Stem from Station 25960 to Station 29900	A	5	4	4	4
SHL	4	Main Stem from Station 29900 to Station 35870	A,B	5	4	4	4
SHL	5	Main Stem from Station 35870 to Station 52360 plus Fosters Branch Tributary	A,C	4	3	4	4
SHL	6	Hancock Branch Tributary	A	5	3	4	4
TAN	1	Main Stem from Station 0 to Station 6290 plus Givens Park Tributaries	A, B	5	3	5	4
TAN	2	Main Stem from Station 6290 to Station 10775 plus West Tannehill Branch Tributary	A	5	3	5	4
TAN	3	Main Stem from Station 10775 to Station 23330	B	1	4	4	3
TAN	4	Main Stem from Station 23330 to Station 30675 plus Tributaries 1 and 2	A	2	4	3	3
WBO	1	Main Stem from Station 0 to Station 4700	A	5	2	2	3
WBO	2	Main Stem from Station 4700 to Station 7270	B	1	4	2	2
WBO	3	Main Stem from Station 7270 to Station 8050	A	5	4	2	3
WBO	4	Main Stem from Station 8050 to Station 17516 plus North Fork Tributary and Tributary 1	A, B	5	3	2	3

Notes: (1) Tier 1 = Very High Problem Area, Tier 5 = Very Low Problem Area

**Table 1-2 continued**  
**WMA Description and Tier Ratings**

Watershed	Watershed Management Area	Description	WMA Approach	WMA Tier Rating <sup>(1)</sup>			
				EC	FC	WQ	INT
WLN	1	Main Stem from Station 0 to Station 4440 plus Tributary 1 and its tributary	A, C	2	4	3	3
WLN	2	Main Stem from Station 4440 to Station 49700 plus Tributaries 3, 4, and 5 plus its tributary	C	1	1	2	1
WLN	3	Main Stem from Station 49700 to Station 80810 plus Tributary 6	C	1	2	3	2
WLN	4	Wells Branch and its Tributaries 1, 2, and 3	C	1	3	4	3
WLN	5	Main Stem from Station 80810 to Station 120165 plus Tributary 7 (and its tributary); Tributaries 8, 9, and 10; Kramer Branch and Tar Branch	C	1	4	3	3
WLR	1	Main Stem from Station 0 to Station 12300	A, B	4	2	3	3
WLR	2	Main Stem from Station 12300 to Station 25740	A, B	5	3	5	4
WLR	3	Main Stem from Station 25740 to Station 34730	A, B	5	3	4	4
WLR	4	Hemphill Branch Tributary	A, B	4	4	5	4
WMS	1	Main Stem from Station 0 to Station 17900	C	2	1	4	3
WMS	2	Saint Elmo Branch Tributary	C	1	5	4	3
WMS	3	Main Stem from Station 17900 to Station 32160 plus Pleasant Hill Tributary	A, C	4	1	2	3
WMS	4	Main Stem from Station 32160 to Station 55560	C	2	1	2	2
WMS	5	Sunset Valley Tributary	A, C	4	2	2	3
WMS	6	Cherry Creek Tributary	A	4	4	2	3
WMS	7	Kincheon Branch and its tributary, Wheeler Branch	C	5	1	2	3
WMS	8	Main Stem from Station 55560 to Station 98000 plus Motorola Tributary and Scenic Brook	C	4	2	2	3

Notes: (1) Tier 1 = Very High Problem Area, Tier 5 = Very Low Problem Area

Figure 1

Flood Control WMA Tier Figure

Figure 2  
Erosion Control WMA Tier Figure

Figure 3  
Water Quality Tier Figure

**Comment [pam1]:** Still waiting for .wmf files or direction for other way to print these.

**Comment [pam2]:** Still waiting for .wmf files or direction for other way to print these.

Figure 4  
Integrated Tier Figure

**Comment [pam3]:** Waiting for input from City

result of State legislation, many new developments will not be subject to existing regulations, let alone new requirements. Results from the Water Supply Suburban Watershed Report (City of Austin, 1999) have provided a clear indication of the large number of exemptions and “grandfathering” to older regulations that are outstanding within the remaining undeveloped lands within and around Austin. Capital solutions will be a necessary part of addressing future problems. An emphasis on acquiring land now while it is still available must be made. Capital solutions can be planned and built in these locations later, when the land may not be available, or may be too expensive to purchase.

WPD must work actively and partner with other City Departments whose missions also affect the health and safety of our waterways, such as the Water and Wastewater Department (W&WW), Parks and Recreation Department (PARD), Transportation, Planning and Sustainability Department (TPS), Public Works Department (PW), and Neighborhood Planning and Zoning Department (NPZ). Many of these Departments have projects within or adjacent to the waterways that impact the stream corridor and WPD mission goals. Some are involved in long term planning projects that also offer potential for integration of missions and co-benefits. When acquiring land, whether for conservation easements or future capital solutions, WPD should pursue joint funding whenever possible for stream corridor restoration and greenbelt establishment.

#### Operating Programs

Operating program enhancements were defined based on a level of service analysis. This analysis resulted in the identification and initial prioritization of needed WPD program enhancements. While some identified program enhancements do not require funding to implement, most will require additional funding approval through the City’s annual budgeting process. WPD will propose budget enhancements incrementally as Council approves proposed increases in the drainage fee. Table 1-3 describes recommended budgetary and other program enhancements.

**Table 1-3  
Programs Recommended for Enhancement**

<b>Program Name</b>	<b>Program Enhancement</b>
Bridge and Culvert Cleaning	Maintain an updated list of problem areas based on assessment of the level of clogging of structures.
Channel Vegetation Control	Program expansion including increased contractals, required to meet demand and customer requests.
Contaminated Site Cleanup	Develop a procedure to assign cleanup costs to identified responsible party.
Detention and Water Quality Pond Maintenance and Rehabilitation	Additional staff to help with completion of short term, priority pond remediations in a timely manner, and provide for annual inspection and maintenance of City-maintained ponds once the short-term work is completed. Currently 150 out of 450 ponds are maintained on a regular basis.
Emergency Spills and Complaints	Additional staff to address increased workload. Upgrade and improve design of database.
Environmental Impact Assessments	Additional staff to expand hydrogeological review to support growing Water Pollution Abatement Plan review needs, cave management plan review/coordination, and karst feature protection and mitigation reviews.
Erosion Control Crew	Additional staff to help reduce the significant backlog of necessary erosion repairs within a reasonable timeframe.
Erosion Project Planning, Implementation and Field Engineering	Additional staff to plan, design and manage construction projects performed by Erosion Control Crew and to provide Utility contact for CIP projects.
Flood Early Warning System	Additional staff to enhance emergency preparedness planning, decision support and response tools.
Flood Hazard Public Information	Additional staff to improve current customer service levels.
Flood Plain Office	Additional staff to create Digital Flood Insurance Rate Maps, to provide public notification of changes in floodplain status (flood insurance requirements), to review development in the floodplain.
Flood Project Planning, Implementation and Field Engineering	Additional staff to meet essential performance levels. Services need to be completed within a reasonable amount of time, and an inventory of existing storm drain locations is needed.
GIS and Database Management	Additional staff for the design and maintenance of database systems, and to provide GIS support for the maintenance activities of the department.
Land Use and Structural Controls Water Quality Monitoring	Coordinate more effectively with users of data. Refocus efforts to monitoring of alternate water quality controls and micro-controls.

**Table 1-3 continued  
Programs Recommended for Enhancement**

Open Waterway Maintenance	Evaluation of channel dredging and sediment removal techniques. Continue coordination with other staff to evaluate the level of sediment accumulation that warrants removal.
Pond Operating Permits	Improve program to include other watersheds and increase pond tracking through a registration requirement.
Pond Vegetation Control	Contractual increase to provide increased frequency in maintenance. Other enhancements include evaluation of vegetation removal frequencies and methods.
Residential and Commercial Pond Inspections	Additional staff to increase ability to complete inspections of 429 Residential Ponds, 3243 Commercial Ponds, and 852 FEMA Creek Crossings.
Review and Inspection of Development	Additional staff to upgrade inspection and enforcement capabilities, improve customer assistance, and provide assistance with consultation on legal issues.
Storm Drain System Cleaning	Identify and target areas with high tree litter for regular maintenance.
Storm Drain System Repair and Rehabilitation	Additional staff to provide an improved level of service. Currently, approximately one-tenth of needed repairs are performed each year.
Storm Sewer Discharge Permits	Additional staff to address increased workload
Town Lake Cleanup	Enhance public education with anti-littering campaigns
Underground Storage Tanks	Stagger permit renewal, enhance coordination with SSDP program, upgrade database, and integrate UST permit with site permit process.
Water Quality Assessments	Additional staff to integrate water quality monitoring database with GIS, and to design and implement more effective monitoring of onsite wastewater treatment/disposal system impacts in cooperation with W&WW ongoing studies, and evaluate impact of leaking sewers on surface and groundwater quality.
Water Quality Control Planning and Implementation	Additional staff to implement expanded WQ retrofit program.
Water Quality Public Education	Additional staff for graphic design, printing, and representation at environmental fairs, and to conduct surveys regarding the effectiveness of the public education initiative.

**Table 1-3 continued  
Programs Recommended for Enhancement**

Watershed Hydrologic and Hydraulic Modeling and Flood Plain Mapping	Additional staff and contractual funding is needed for implementation of a systematic model maintenance and upgrade procedure updating of the existing watershed models; and for development of an efficient digital model storage and retrieval system.
Watershed Management and Facilities Planning	Additional staff to perform engineering assessments and preliminary engineering, provide project planning and design for large-scale projects.
Watershed Master Planning	Phase II funding necessary for watershed assessments and solution development.

Regulations

The proposed regulatory changes are merely proposals and planning level recommendations at this time. Each proposal will require drafting of code, regulation, and/or criteria language. These proposals will be drafted as changes to the Land Development Code and the Environmental and Drainage Criteria manuals. City code changes, including changes to the Land Development Code, require review by the appropriate City boards and commissions. These proposed changes would go through the standard public meeting process to obtain input from interested parties. The final step is the City Council hearing where action may be taken.

Proposed rule changes are subject to stakeholder review and a public review period. This includes proposed changes to Criteria manuals. After stakeholder review, the rule is posted for public comment prior to final adoption. Table 1-4 summarizes the proposed regulatory changes for each of the categories listed above.

**Table 1- 4  
Proposed Regulatory Modifications**

<b>Incentives</b>	
<b>Landscaping-Low Impact Development</b>	Allow for landscape credit to be given to developers who choose to use low-impact development techniques located within landscaped areas to receive runoff from their site. Water Quality credit could be offered for such low-impact design alternatives. See alternative WQ Design criteria under customer service/assistance below.
<b>Erosion Control-Site Management</b>	Update the Environmental Criteria Manual to incorporate in materials and design standards to coordinate with the COA Standards Manual. Incentives such as reduction or early release of fiscal could be offered for those using improved site management techniques such as storing and reusing native topsoil, minimizing time between grading and revegetation, use of native or xeriscape plant material and seed mixes, and waste racks to control mud tracking.
<b>Development Mitigation Policy</b>	Mitigation Policies can benefit both the City and landowners when transfer of development rights are allowed between different properties through mitigation that includes concepts such as: 1) the transfer result in less impervious cover than otherwise allowed, 2) transfers move development from more environmentally sensitive land to less sensitive land, 3) transfers move development to areas that can be served using existing public infrastructure, and 4) transfers are structured to preserve open space and natural areas within each watershed.
<b>Public Service/Assistance</b>	
<b>WQ Design Criteria</b>	Revise and expand the Environmental Criteria Manual to include standard design criteria and assessments methods for alternative water quality controls based on average annual pollutant load reductions.
<b>Erosion Control-NPDES Permit Provisions</b>	Update City of Austin erosion control criteria to include or reference Federal NPDES construction permit requirements creating a consistent set of criteria for local developers to follow.
<b>Uniform Relocation Assistance</b>	Address relocation assistance in instances where residential or commercial property threatened by flooding or creek erosion is acquired by the City on a voluntary basis.
<b>Infrastructure Management</b>	
<b>Revise RSMP and Urban WQ Control Fees</b>	Fee amounts have not been evaluated since program origin in 1980's for RSMP and 1990 for WQ fee. Fees are currently being reviewed to determine if they adequately address increases in land and construction cost while still remaining low enough to encourage participation. Establish participation criteria for WQ fee-in-lieu-of.
<b>Drainage System and Waterway Maintenance Criteria</b>	Regulation to allow the maintenance of drainage easements in the original permitted design configuration and to define conditions warranting vegetation removal in order to adequately convey storm water flows. Set standards for maintenance performed within waterways, including soil stabilization and replanting.

**Table 1- 4 continued  
Proposed Regulatory Modifications**

<b>Infrastructure Management continued</b>	
<b>Drainage Study, Floodplain and Easement Delineation Standards</b>	Require drainage easements to be designed using an assumption of infrequent maintenance.
<b>WQ Control Registration</b>	Current requirements exist for operating and maintenance permits for the Barton Springs Zone. Expand registration of WQ controls City wide as a prerequisite for getting reductions in drainage fee to help track location and ownership of controls. Actively publicize fee reduction/registration program.
<b>Problem Prevention</b>	
<b>Stream Setbacks</b>	Establish erosion control based stream setbacks to provide property protection from the threat of erosion. Maintain vegetation in the critical water quality zone using native plants without managed turf grass, pesticides or unapproved fertilizers.
<b>Design Storm Runoff Detention for Stream Bank Erosion</b>	Require developments to capture and detain the runoff volume greater than that released from the undeveloped site for those small and relatively frequent storms that control the channel size and shape. The smaller storms should be detained for an optimum detention period to prevent erosion damage to property and the stream system.
<b>Effluent Irrigation Standards</b>	Require additional soil depth for effluent irrigation, to specify maximum nitrogen loading, to require additional wet weather storage, to require setbacks from watercourses and Critical Environmental Features, and to require monitoring for effluent constituents.
<b>Golf Course Management Plan</b>	Require a management plan for all golf courses to include components for water balance, fertilizer loadings and monitoring, and would limit activities in the critical water quality zone.
<b>Drainage Design Criteria</b>	Revise the Drainage Criteria Manual to ensure that new or altered channels are properly designed to minimize future erosion. Potential modification would include adding permissible shear stress criteria for both the bottom and side-slopes for the 1-, 2-, 10-, 25- and 100- year storm events.
<b>Tree Protection Standards</b>	Expand tree protection requirements to allow for specific circumference regulations for different tree species, to require a percent of site be left in a natural area, to protect significant groves of trees, to evaluate establishing a minimum percent canopy cover for a site, and to establish a mitigation fee system for tree replacement.

A five-year implementation plan for regulatory modification has been developed to facilitate the process. Proposed regulations were considered based on the urgency of the need; preventative regulations were given high priority. Available staff resources were also considered to allow for a balance between programmatic, capital and regulatory implementation. Public input has been an important factor in development. The plan has been reviewed by both the Citizens Advisory Group and the Environmental Board. The five-year regulatory implementation plan is shown in Table 1-5.

**Table 5  
5 Year Regulatory Implementation Plan**

Proposed Regulation	Regulatory Description	Category	Location of Modification	% Complete	Timeframe
Landscape Low Impact Development and Alternative WQ Controls See also WQ Design Criteria Below	Proposes alternative methods of water quality treatment including headwater protection, rainwater harvesting and micro pooling. Will require modifications to landscape code.	Incentive	LDC, ECM	See components below	see components below
Landscape Modifications and LID Design Issues	Amends landscape ordinance to allow for landscape credit to be given for developments that use low-impact development techniques located within landscaped areas that receive runoff from the developed site. Design guidelines that utilize greenspace to incorporate water quality treatment.	Incentive	LDC, ECM	0	2003
Rain Gardens	Water Quality components that are built into greenspace and treat small drainage areas from adjacent development. Includes Biodetention; small scale BMP that includes capture of WQ volume in a landscaped depressed area to reduce pollutant loads and volume.	Incentive	ECM	0	2004
Rainwater Harvesting	Including cisterns, rain barrels, ponds, etc.	Incentive	ECM	criteria <5%; monitoring underway	2006
Headwater Protection	Requirement or incentive to provide setbacks from small watercourses (5 ac. Drainage area or more) to preserve natural conditions and provide increased protection for streams).	Incentive	LDC/ECM	10%	2002
Cluster Development	Revise Code to provide incentives for defined cluster development for water quality benefits.	Incentive		0	2002
WQ Design Criteria See also LID and Alternative Criteria above	Revise and expand the ECM to include standard design criteria and assessment methods for alternative water quality controls based on average annual pollutant load reductions.	Service to Public	ECM	see components below	see components below
Vegetated Filter Strips	Includes biofiltration as designed by Murfee Engineers.	Service to Public	ECM	5%	2004
Retention/Irrigation Criteria	To provide criteria for design, installation and maintenance of retention/irrigation systems	Service to Public	ECM	30%	2003
Retention/Irrigation Specifications including pumps for irrigation	To provide specification for City-maintained retention/irrigation systems and pumps for irrigation systems	Service to Public	ECM	30%	2003
Pervious Paving	To provide standards for new medias, potentially as replacement to standard sand, to achieve higher pollutant removal rates, especially for nutrients	Service to Public	ECM	0%	2003
Wet Pond Criteria Update	Update Plant list	Service to Public	ECM	0%	2002

**Table 1-5 continued**  
**5 Year Regulatory Implementation Plan**

Proposed Regulation	Regulatory Description	Category	Location of Modification	% Complete	Timeframe
Alternative Filtration Media	To provide criteria for design, installation and maintenance of retention/irrigation systems	Service to Public	ECM	5%	2005
Revise RSMP	Fee amounts have not been evaluated since program origin in the 1980's. Fees are currently being reviewed to determine if they adequately address increases in land and construction cost while remaining low enough to encourage participation.	Infrastructure Management	Annual Fee Ordinance, DCM	70%	2002-3
Revise Urban WQ Control Fee	Fee amounts have not been evaluated since program origin in 1990. Fees are currently being reviewed to determine if they adequately address increases in land and construction cost while remaining low enough to encourage participation.	Infrastructure Management	Annual Fee Ordinance, ECM	65%	2002-3
Establish participation criteria for the Urban WQ fee in lieu. This has been separated from Urban WQ Fee task	Rule to establish when it is appropriate to accept payment in lieu of water quality controls in the Urban watersheds	Problem Prevention	ECM	75%	2002-3
Drainage System and Waterway Maintenance Criteria	Regulation to allow the maintenance of drainage easements in the original permitted design configuration and to define conditions warranting vegetation removal in order to adequately convey storm water flows. Set standards for maintenance performed within waterways.	Infrastructure Management	ECM/DCM and internal policy	20%	2004
Drainage Control Registration	Current requirements exist for operating and maintenance permits for the Barton Springs Zone. Expand registration of drainage controls City wide as a prerequisite for getting reductions in drainage fee to help track location and ownership of controls.	Infrastructure Management	Internal policy process	95%	2002
Stream Setbacks	Establish erosion control based stream setbacks to provide property protection from the threat of erosion. Maintain vegetation in the Critical Water Quality Zone using native plants.	Problem Prevention	LDC, DCM, ECM	10%	2003-4
Design Storm Runoff Detention for Stream Bank Erosion	Require developments to capture and detain the runoff volume greater than that released from the undeveloped sites for small and relatively frequent storms that control channel size and shape. The smaller storms should be detained for an optimum detention to prevent erosion damage to property and the stream system.	Problem Prevention	LDC, ECM, DCM	80%	2002-3
Effluent Land Application Standards	Require additional soil depth for effluent irrigation, specify maximum nitrogen loading, require setbacks from watercourse and Critical Environmental Features, require monitoring for effluent constituents, evaluate wetweather storage.	Problem Prevention	LDC, ECM	Proposed Code Changes - 90%; criteria not started	2003

**Table 1-5 continued  
5 Year Regulatory Implementation Plan**

Proposed Regulation	Regulatory Description	Category	Location of Modification	% Complete	Timeframe
<b>Drainage Design Criteria (the 2 additional criteria below are suggested as possible areas to be considered for improvement in the DCM)</b>	Revise the DCM to ensure that new or altered channels are properly designed to minimize future erosion. Potential modification would include adding permissible shear stress criteria for both the bottom and side slopes for the 1-,2-,10-, 25- & 100-year storms	<b>Problem Prevention</b>	<b>DCM</b>	<b>0</b>	<b>2003</b>
Discharges to Steep Slopes	Criteria to minimize erosion due to outfalls discharging to creeks	Problem Prevention	DCM	0	2003
Storm Sewer Outfalls to Creeks	Criteria to minimize erosion due to outfalls discharging to steep slopes	Problem Prevention	DCM	0	2003
<b>Tree Protection and Natural Area Standards</b>	<b>Expand protection to allow for specific circumference regulations for different tree species, to require percent of site be left in a natural area, to protect significant groves of trees, to evaluate establishing a minimum percent canopy coverage for a site.</b>	<b>Problem Prevention</b>	<b>LDC, ECM</b>	<b>20%</b>	<b>2002-3</b>
<b>Erosion Control-NPDES Permit Provisions</b>	<b>Update COA criteria to include or reference NPDES construction permit requirements for consistency in permitting requirements.</b>	<b>Service to Public</b>	<b>LDC, ECM</b>	<b>10%</b>	<b>2003</b>
<b>Title IV, Chapter 4-1 Code Revision (Discharges to Storm Sewers and Waterways)</b>	<b>Revise criteria to update references to agencies; redefine COA jurisdictional area (includes some definitions); and, delete exemption for State and Federal permit holders</b>	<b>Problem Prevention</b>	<b>ECM</b>	<b>0</b>	<b>2003</b>

ECM- Environmental Criteria Manual; DCM- Drainage Criteria Manual; LDC- Land Development Code  
bold type indicates a major category, regular type indicates a component of a major category.

The Watershed Protection Master Plan Report will be revised periodically to reflect updated information. WPD will continue to improve water quality modeling efforts by utilizing new information available. As capital solutions are put in place, and existing problems are rectified, updates will also be made to the existing problem score to keep current information on high priority needs.

Technical studies for Onion Creek are currently underway to provide the Flood and Erosion missions the data necessary to complete problem assessments. As funding becomes available, flood and erosion studies will be conducted on other Phase II watersheds.

WPD will continue to work with the public in developing sustainable watershed solutions for all watersheds in the City of Austin.

### ***SIGNIFICANT YEAR 2001 WATERSHED PROTECTION ISSUES***

The following items outline several major issues developing during the past year that the City has responded to in order to further watershed protection. These projects include the ongoing involvement in the Longhorn Pipeline project, Mabel Davis park remediation, participation in regional water supply planning in response to the Lower Colorado River Authority northern Hays southwest Travis county waterline project, development of management solutions for hydrilla, progress on the east Austin tank farm remediation, the characterization of the November 15<sup>th</sup> storm event, and participation in the Texas Colorado Floodplain Coalition.

#### **Longhorn Pipeline Environmental Assessment**

Longhorn Pipeline Partners, the owners of this dormant pipeline that crosses through South Austin and across the Edwards Aquifer and the Barton Springs Zone, are in the process of converting the line from crude oil transport to refined petroleum product

transport, e.g. gasoline. The City, the Barton Springs-Edwards Aquifer Conservation District, the LCRA and several private individuals filed suit against the owners of the pipeline, the US Environmental Protection Agency (EPA), the US Department of Transportation (DOT), and the Department of the Army to halt the project and require an environmental and safety review. As a settlement to that lawsuit, the defendants agreed to do an environmental assessment based on Settlement requirements and the National Environmental Policy Act.

The draft Environmental Assessment was issued in October 1999. The draft Assessment contained a Preliminary Finding of No Significant Impact. In November 2000, the Federal agencies issued a Final Finding of No Significant Impact. Shortly afterward, the City and the other plaintiffs returned to court in an effort to have the decision overturned. The plaintiffs (including the City) contend that the Federal decision was not supported by the scientific evidence and fails to adequately address public safety, environmental impacts and drinking water impacts. This court case is still pending and it is not known when the Court will rule.

In 2001, Longhorn voluntarily submitted their project to the City's Land Development Code (LDC) and filed a number of site development applications for replacement of pipe in several areas of the City. WPDRD staff spent considerable time and effort reviewing the Longhorn submittals. The LDC addresses environmental controls required during construction and completed surface water quality impacts of the project. In December 2001, Longhorn began construction without receiving approval of their site plan from the City. The City issued multiple Notices of Violation and filed charges in Municipal Court for violations of the LDC. Subsequent to receiving that action, Longhorn filed a lawsuit in Federal Court asking the Court to prevent the City from enforcing the Land Development Code. The Court did not enjoin the City, but did make it clear that it was the Court's opinion that the City did not have jurisdiction. The charges in Municipal Court have been dropped and Longhorn is proceeding with replacing its pipe without City approval.

## Mabel Davis Park Remediation

Mabel Davis Park is located in southeast Austin, just north of Hwy 71 and about one mile east of IH-35. The site contains an abandoned landfill that was operated in the 1940's and 1950's. The City developed the park in 1979. In the winter of 1999 and the spring of 2000, soil sampling at the site discovered elevated levels of lead and pesticides in a number of areas of the park. The pesticide contamination is believed to be a result of a surface release of the pesticides during excavation by construction workers during park development, and the lead contamination is associated with battery fragments found over portions of the old landfill.

As a result of the discovery of the contamination, the park (except for the pool) was temporarily closed to the public until a complete assessment can be completed and any necessary remediation completed. While the contaminant levels are not believed to prevent an immediate public health hazard, the City believed closing the park was the safest course of action. A public meeting was held in June 2000 to provide information to the community about the contamination and closure. A second meeting was held in June 2001 to update the community on the progress of the assessment.

The site has been accepted into the Texas Natural Resource Conservation Commission's (TNRCC) Voluntary Cleanup Program (VCP), which will provide expedited regulatory review, by the State of Texas. The site is subject to the TNRCC Risk Reduction Program regulations. As part of those requirements, WPDRD, in cooperation with Solid Waste Services and the Parks and Recreation Department are developing an Affected Property Assessment Report (APAR). The APAR provides a comprehensive assessment of the contamination at the site and will be used to develop a plan to remediate the contamination. The APAR should be complete in late summer or early fall 2002 and will be submitted to the TNRCC for review and approval. Once that approval is received, the City will develop a remediation plan and restore the site. At this early date it is difficult to project a completion date, but because of the size and

complexity of the site, the remediation is expected to take until at least 2004 and very possibly later. Certain portions of the site may be opened as early as this year if the assessment determines those areas to be free of contamination.

### Austin Community Landfill Industrial Waste Unit

At the request of the City Council, WPDRD staff has been working with Waste Management, Inc. (WMI) staff to develop a groundwater-monitoring plan for the Austin Community Landfill (ACL) Industrial Waste Unit (IWU). The IWU is a closed industrial liquid waste disposal area that was operated in the 1970's and received large quantities of solvents, acids and other industrial liquid wastes. Citizens have been concerned that the IWU might be leaking and that monitoring of groundwater and surface water is inadequate to detect leakage before it causes environmental impact. City staff is nearing completion of an agreement with WMI that will significantly enhance the ability of WMI to detect leakage from the IWU before it leaves the ACL facility.

City staff has monitored, reviewed and commented on the Environmental Impact Statement (EIS) process and each related submission from the LCRA and consultants. The EIS is scheduled for completion in October 2001 and the Service has three months from that time to modify the water quality protection measures.

### Lake Austin Hydrilla

#### Introduction

Since it was first documented in Lake Austin in July 1999, the nuisance exotic plant hydrilla has grown from 25 acres to 245 acres, impacting many recreational users with its dense mats. These mats impede shoreline access and limit activity, posing a major safety concern, as they can entangle swimmers and skiers. Potential impacts include clogging of water intakes, water quality degradation and decreasing property values, as well as downstream spread to Town Lake and the Colorado River.

The activities conducted since the last State of the Environment Report for control of the nuisance exotic plant hydrilla in Lake Austin included the following:

- Drawdown of the lake in January 2001 to kill the surface portion of the plants growing in 12 feet of water or less and allow access for removal of plants and installation of bottom barriers. Planning and negotiation with LCRA for an early 2002 drawdown was also conducted in late 2001.
- Additional discussions with Texas Parks and Wildlife Department (TPWD) concerning grass carp stocking
- Further public education efforts associated with the drawdown
- Two vegetation surveys to track regrowth of the plant after the drawdown
- Planning for ecosystem restoration opportunities in Lake Austin through available Federally funded programs.

In addition, a public interest group, the Friends of Lake Austin has organized to promote hydrilla control in Lake Austin, and to develop an alternative treatment proposal for submittal to the TPWD.

#### January 2001 Lake Drawdown

In an effort to provide short-term control of all aquatic vegetation, Lake Austin was lowered approximately 12 feet for a period of six weeks in late January to early February 2001. During this time, residents and the City worked to remove both hydrilla and milfoil and install bottom barriers (gas permeable material that prevents weed growth) along the exposed shoreline. Informal surveys of the lake this spring showed that the drawdown had provided a fairly clear shoreline. The areas that were full of densely matted hydrilla in April 2000 were noted to be clear of the weeds the following April. In addition, many native plants colonized areas that previously had been densely covered with hydrilla, but since these natives cannot grow in deeper water; hydrilla maintains its dominance in the lake. Although the drawdown knocked back the visible vegetation, it was unlikely that hydrilla roots and tubers were severely affected. In areas that experienced dense hydrilla mats early last spring, hydrilla

reached similar densities much later in the year. Small areas of dense mats were noted in July and had increased through the late summer and fall.

Because of the positive results after the January 2001 drawdown, the lake was again lowered this year to provide short-term control of the hydrilla growth in shallow water. Although lowering the lake did limit growth in near shore areas through the peak recreation season, it should not be viewed as the single solution for long-term control of the growth. Since the lake levels only drop by 12 feet (limited by the depth of drinking water intakes), the hydrilla in deeper water is unaffected by the drawdown and continues to grow and spread. The drawdown has provided relief from hydrilla for a substantial portion of the recreational season, and the City is considering annual drawdowns as one potential control for the plant, but will determine this on a year-to-year basis.

#### Additional Grass Carp Discussions with TPWD

In early April 2001, the City requested that TPWD reconsider the City's request for a grass carp permit, stating that in order to ensure the safety of all lake users, the City would pursue all potential avenues to address the hydrilla problem. TPWD responded that they were still not ready to consider grass carp for the lake, citing the lack of evidence that hydrilla will continue to spread, as well as the concern that the carp would leave the lake during periodic flood releases from Tom Miller Dam.

Their concerns include the potential for loss of too much vegetation, possibly damaging the lake's excellent fishery, as well as the possible impacts to downstream fisheries if the carp leave the lake during a flood event. The agency has asked that all possible containment strategies, such as electric barriers, be investigated to keep the fish in the lake. LCRA has taken on that evaluation.

Since the 2000 SOE report, despite letters to the TPWD Director and several legislators, as well as a meeting facilitated by a TPWD Commissioner, TPWD has shown no indication of approving a permit for grass carp stocking. In February 2002, staff from the City Manager's office and WPDRD met with TPWD Executive Director

and staff. The City proposed an interim stocking of 3,000 sterile grass carp to take advantage of the reduction of hydrilla expected from the recent drawdown. TPWD considered the request but would not support it prior to completion of a tracking study.

The TPWD requested tracking study would include release of 25 radio tagged sterile grass carp in Lake Austin. Although not intended to provide control, these fish will be studied to see how many move downstream under varying flow conditions. Set to begin this spring, the tracking study is a cooperative effort of the City of Austin, TPWD, LCRA, and Southwest Texas State University. A public hearing required by TPWD prior to stocking these 25 fish is set for April 15<sup>th</sup> at TPWD Austin headquarters. The study is not designed with a specific end time; instead, a set of flow conditions, including hydrogeneration and flood releases, must be met in order to end the study. It is hoped that information on downstream escapement will then be available for TPWD to re-consider stocking the fish as part of a larger control effort.

#### Public Education

Targeted mailouts to lakeside property owners have included a general brochure regarding the plant's growth habit and control methods, a flyer detailing control options appropriate for lakeside residents, and a survey to evaluate the effectiveness of bottom barriers installed during last winter's drawdown. In addition to responses from citizens, COA staff conducted a field survey of bottom barriers soon after the lake went down in January. Results from these surveys were compiled and made available on the City's web site.

To reach a more general audience of lake users, signs at public boat ramps explain the need to remove hydrilla from boat props and trailers to limit spread of the plant. The City's web site has a substantial section on hydrilla, with general information as well as details on control efforts to date. LCRA is currently developing an electronic bulletin board that will be linked to the City's web site. Citizens will use it to discuss issues related to the hydrilla infestation.

To gather ongoing public input, staff participates in monthly meetings of the LCRA's citizen group, the Lake Austin Advisory panel. Appointed by LCRA's Board of Directors, members of this panel represent Lake Austin residents and business owners. The panel has shown considerable support of City hydrilla control efforts.

### Vegetative Surveys

Although the 2001 drawdown did provide relief from dense hydrilla growth early in the recreational season, an aquatic vegetation survey done by the Texas Parks and Wildlife Department (TPWD) on July 16<sup>th</sup> –17<sup>th</sup>, 2001, documented approximately 380 acres of all types of vegetation in the lake, including 244 acres of hydrilla. This is 48 more acres of hydrilla than in 2000, an increase of 24%, in spite of the lack of hydrilla in less than 10 feet of water (where it was very dense the previous year).

While the shoreline was clear out to about 10 feet deep, the plants continued to fill the main channel from 12 to 25 feet deep, and had moved downstream of Loop 360 (the downstream limit in 2000), well below where Bull Creek enters the lake. In addition to this downstream spread, the plants were also documented at Tom Miller Dam, the farthest downstream point of the lake.

Hydrilla now covers over 15% of the lake surface (up from 12% in 2000) and comprises 64% of the total vegetation. This is significant, because hydrilla was only 38% of all vegetation in 2000 and less than 9% of all vegetation when it was first documented here in 1999. Milfoil coverage decreased significantly, from 218 acres in 2000 to only 82 acres this year, because lowering the lake is a very effective control tool for that plant.

By late fall 2001, dense mats of hydrilla were present in some areas of the lake, but much of the shoreline was still clear. Some residents report growth of hydrilla in less than six feet of water, a significant change since TPWD's survey in July when the plants were limited to water deeper than 10 feet.

## Ecosystem Restoration Planning

In looking beyond the short-term solution of the drawdown, the City has had extensive discussions with the Army Corps of Engineers (COE) and its research branch, Lewisville Aquatic Ecosystem Research Facility (LAERF). LAERF staff has considerable expertise in aquatic plant control, and can provide guidance regarding innovative control options appropriate for Lake Austin. Staff from LAERF has conducted site visits on Lake Austin in late January 2002 for a preliminary assessment of the hydrilla infestation, as well as the feasibility of various control methodologies.

The focus of continued efforts will be the restoration of the Lake Austin ecosystem, including revegetation with native plants and habitat enhancement of native herbivores (plant eating animals, such as turtles). Also possible is the introduction of the hydrilla fly, a host specific insect whose larvae feed on hydrilla only. A drawdown of some frequency could be part of this restoration, as variable water levels can mimic a more natural system, and encourage growth of many native plants. City staff is currently working with LAERF to develop a scope for several pilot projects testing these innovative methodologies. Potential federal and state funding sources have been identified for this work and are being pursued.

Staff is also proposing further partnering with LCRA and COE and is working on an interlocal agreement to study the feasibility of ecosystem restoration projects on Lake Austin using the LAERF pilot work and the original hydrilla management plan developed for the lake. While these options are being investigated, the need for 'spot' treatment of dense hydrilla infestations will be assessed throughout the year.

For the next few years, hydrilla control will be ongoing and costly, so discussions with the COE, LCRA, and TPWD include not only control options but also funding possibilities. These discussions have been very positive, with at least three possibilities for federal matching (or fully funded) programs currently identified. An update on funding options will be provided to Council when more information is available.

### Friends of Lake Austin Organization

As hydrilla continues to grow in the lake, lakeside residents may begin considering various control options. A new state law in effect since February 2001 requires that individuals doing any type of aquatic vegetation treatment must notify TPWD and file a treatment proposal. This law applies to all types of control, including grass carp stocking, harvesting and herbicide applications. This law also requires that TPWD maintain a list of all individuals requesting notification of any herbicide application on a specific water body. This law also allows for large-scale treatment proposals to be submitted to TPWD by citizen groups in addition to municipal and regional control agencies such as the City or LCRA.

In order to take advantage of the new state law, a recently formed citizen group, the Friends of Lake Austin (FOLA) has decided to develop an alternate treatment proposal for submittal to TPWD. They have hired a biologist to develop a management plan and a lobbyist to assist in garnering political support for the plan. WPDRD staff provides ongoing technical assistance and educational materials where appropriate, and intends to work with stakeholders groups such as this to implement the appropriate measures for hydrilla control on Lake Austin to the benefit of all users of this resource.

### East Austin Tank Farms Issues

City staff continues to work closely with the community around the former East Austin Tank Farms and the Texas Natural Resource Conservation Commission (TNRCC) on issues related to the assessment and remediation of contamination from these former oil company properties. Council and community concerns are brought forward for discussion with State regulators and the oil companies.

In 2001, City staff met with Oil Company and TNRCC staff a number of times to discuss progress of the off-site assessment. In March 2001, the TNRCC issued directives to the oil companies ordering completion of a comprehensive offsite

assessment by June 2002 and rejecting the Affected Property Assessment Reports submitted by the oil companies in November 2000. Staff has been reviewing quarterly groundwater monitoring reports and passing any questions or concerns on to the TNRCC or directly to the oil companies.

### The Lower Colorado River Authority (LCRA) Northern Hays and Southwestern Travis Counties Water Supply System

The availability of surface water may become a catalyst for more rapid and intense growth in Travis and Hays Counties outside of Austin. The historic pattern of growth, low-density development, was fostered not only by economics and personal preference, but also by space requirements for groundwater wells and on-site septic systems. Surface water use coupled with, in some cases; centralized sewer service removes many of the regulatory limits (especially in Hays County) to more intense development. The provision of surface water in northern Hays and southwestern Travis counties is controversial due to the impact to surfacewater and groundwater quality that could result from the enhanced development.

The first phase of a water supply system that may eventually serve large portions of southwest Travis County and northern Hays County, including Sunset Canyon, Dripping Springs, and other areas along Highway 290, Hamilton Pool Road and Ranch Road 12, was proposed by LCRA last year. But, because of potential impacts to endangered species, especially the Barton Springs Salamander, the US Fish and Wildlife Service (USFWS) required the US Army Corps of Engineers, and its non-federal representative, the LCRA, to undergo a Section 7 consultation. Consultations eventually lead to USFWS issuing a biological opinion that prescribes reasonable and prudent measures to protect an endangered species.

Before the consultation could be formally initiated, representatives from local agencies declared a drought emergency. The Service agreed, in deference to the emergency, to expedite the consultation and allow construction on the water line to begin as quickly as possible. By October 2000 the Service had issued their opinion. The LCRA was

allowed to serve only existing and unbuilt but approved development. New development would only be served from the waterline if the development complies with water quality protection measures outlined in the opinion. Furthermore, the LCRA committed to underwrite the cost of an environmental impact study (EIS) to assess the effectiveness of the water quality protection measures proposed in the biological opinion to mitigate impacts of the waterline. The measures can be modified by the Service based on findings from the EIS.

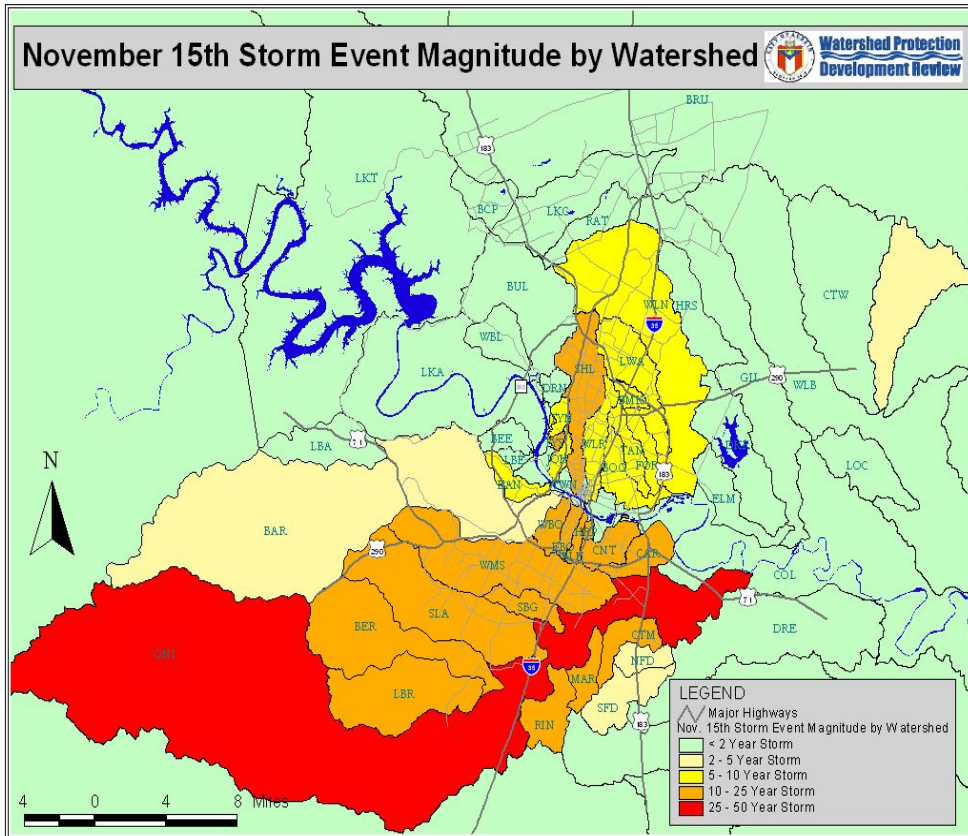
By year-end the LCRA's consultants completed a draft report. Originally, the Service had hoped to conclude their review of the study within 90 days of its publication; however, that deadline has been relaxed to allow LCRA time to review stakeholder comments and finalize the report. City staff worked with the report authors throughout the study, and provided them with comments to the EIS and its related work products. There is still considerable disagreement between representatives from different sectors of the community, including the City of Austin, about the study's approach and findings. A series of technical meetings are scheduled for March 2002 to discuss the study, additional analyses and revisions to the final report.

#### Characterization of November 15, 2001 Storm Event

A substantial storm accompanied by high winds and tornadoes moved into the Central Texas area on the night of November 14, 2001; at some locations the storm produced as much as 15 inches of rainfall during the period November 14<sup>th</sup>–16<sup>th</sup>. High-intensity rainfall in parts of the area caused substantial flooding in many streams in the Colorado and Guadalupe River Basins. The Austin American Statesman reports that 9 people drowned area wide during the floods. One flood related drowning fatality occurred within the Austin City limits.

On November 15<sup>th</sup>, the storm system stalled over central Texas, west of Austin, and waves of rain and thunderstorms began to sweep up the I-35 corridor. The flooding was substantial in the South Fork, San Gabriel River in Williamson County; in the Llano and Pedernales Rivers; in Barton, Shoal, Williamson, and Onion Creeks in the

Austin area; and in the San Marcos and Blanco Rivers in Blanco, Hays, and Caldwell Counties. A large thunderstorm loomed out of Hays County at approximately 3:30 p.m., and rapidly threatened Austin and Travis County with tornadoes and flash flooding.



### Response to Flood Emergency

The engineers responsible for the Flood Early Warning System reported to the Austin Travis County Emergency Operations Center to interpret the rainfall and stream water elevation data. Personnel of the Austin Office of Emergency Management were on duty responding to reports of tornadoes at Buda, near the William Cannon Blvd. and I-35 intersection, and at the I-35 and Ben White Blvd. interchange. At Austin Bergstrom International Airport winds gusted to 62 mph.

The heaviest rainfall began about 3:30 p.m. over south central Austin in the middle of the Slaughter Creek basin and upper South Boggy Creek basin. By 3:40 p.m. the Flood Early Warning System indicated that the initial intense downbursts had not lessened, and radar indicated that more rainfall was heading into the City from south to north. At that time, the first general warning statement was issued that “Extremely intense rainfall (is) tracking up from South Austin. Anticipate widespread urban and small stream flooding throughout Austin. PARD should evacuate parks in flood prone areas.” At 3:41 p.m. a warning was made for out-of-bank flooding in Williamson and Slaughter Creeks. At 3:44 p.m., a third warning was issued to prepare to evacuate the Woodview Mobile Home Park on West Bouldin Creek. At 3:46 p.m., a fourth warning was made for possible out-of-bank flooding along lower Shoal Creek in the 900 to 1200 block of North Lamar within the next one to two hours if intense rain were to continue as the storm tracked further north.



Flooded, Floating Cars at the Intersection of 10<sup>th</sup> & Lamar November 15, 2001

The intense thunderstorm cells did continue to track rapidly and generally north-northeast over Barton Creek at Loop 360, West Bouldin Creek, Johnson Creek, and

Shoal Creek watershed.

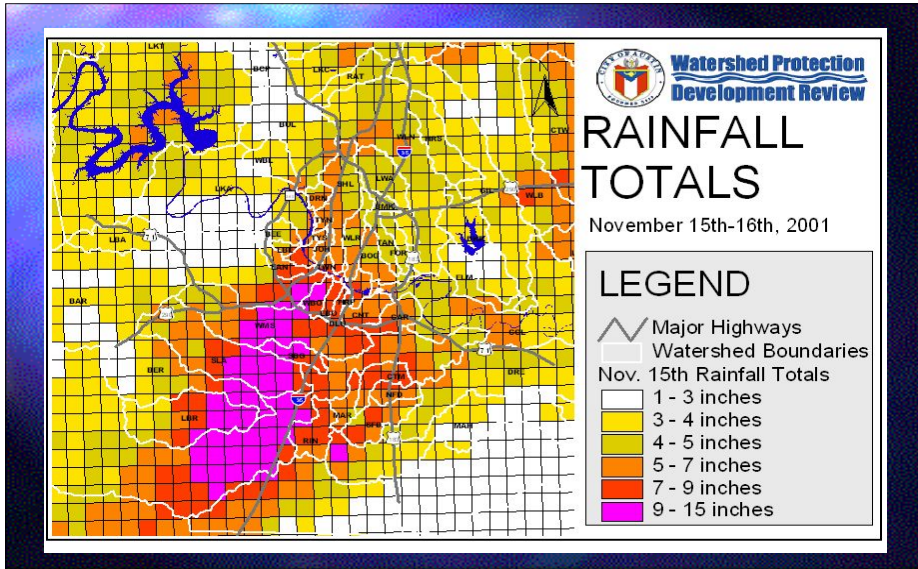
Emergency Response Summary

- 100-200 people affected by water rescues/evacuations
- 30-40 road closures
- 17 Public Announcements
- 16 traffic signals had power out/22 flashing
- One shelter opened-4 days-142 people served
- 32,000 meals prepared
- 1000 Fire Dispatch calls (450 within 3.5 hours)
- 539 EMS calls
- 1034 Flood Early Warning System (FEWS) Alarms
- 25 High Risk Swift Water Rescues
- 17 Star Flight Short Haul Rescues
- 42,000 Electric Customers without power
- Approximately 500 homes isolated by high water
- AISD delayed school release



Water Rescue on Lower Shoal Creek Near 10<sup>th</sup> and Lamar November 15, 2001

Widespread rainfall totals were typically on the order of five to eight inches, with individual reports of ten inches and more. Rain gauge-adjusted radar images indicate



that some areas may have received up to 15 inches of rain. Much of this rain fell within the space of six hours. Generally, the storm intensities and flood levels were higher on the south and west side of town. Rainfall intensities exceeded the estimated 100-year rainfall rates in some locations and caused widespread isolated flood damage where the drainage capacity of streets and storm drains was exceeded by localized rainfall.

Significant rainfall total reports from gauges around Austin were as follows:

- 8.68 inches at ABIA airport
- 8.38 inches at Barton Creek and Loop 360
- 7.73 inches at Onion Creek
- 7.55 inches at Camp Mabry
- 6.13 inches at Great Hills (Bull Creek)
- 6.49 inches at Bull Creek and Loop 360

Storm magnitude estimates for the most severely impacted watersheds are as follows:

<b>Watershed</b>	<b>Approximate Return Period</b>
Onion Creek	50 year
East/West Bouldin	10-25 year
Shoal Creek	10 year +
Walnut Creek	10 year
Williamson Creek	10 year

Cherry Creek Tributary to Williamson Creek and other smaller drainage basins in South Austin may have experienced floods near the 100-year event. This storm event was the largest in areal coverage and flood magnitude since the May 1981 flood.

### Flood Damage Reports

- One Fatality, Six Injuries
- Private Property Damage Estimate: \$15,000,000
- Public Infrastructure Damage: \$12,000,000

Flood damage was assessed based on American Red Cross damage reports, direct citizen reports to the City of Austin, and City staff field reconnaissance.



Colton-Bluff Springs Road – Onion Creek Watershed 11-16-01

Eight hundred and sixty (**860**) flooded structures including residential and commercial buildings have been recorded. Based on this information it is estimated that

approximately **1,000** total building structures were flooded in this storm. Many buildings were affected by the flood but owners/occupants did not report damages.



Cherry Creek Neighborhood – Williamson Creek Watershed November 20, 2001

**Structures Flooded November 15, 2001 Storm Event  
Recorded by Watershed Protection and Development Review Department  
Preliminary Report**

Boggy Creek

- New York Avenue & Pleasant Valley Road: apartment complex (no name), **4 apartment units flooded**, <1', minor damage
- Poquito Street (1100 block). culvert guard rail down
- Rosewood @ Poquito: significant street flooding from local drainage
- 200 LF of concrete rip-rap under US 183 removed during flood; manhole dislodged into creek
- Delwau Lane Bridge overtopped about 6 feet; significant scour under bridge
- Delwau Lane (7106, 7503) –**2 houses flooded**, 2+', major damage

West Bouldin Creek

- Wood View Mobile Home Park, 1301 W. Oltorf: **7 mobile homes flooded**, 1'

### West Bouldin Creek continued

- Major roadway flooding at Barton Springs Road near the Dawson Road intersection.
- **5 residences flooded:** 1006 Daphne, 4 at 3800 Garden Villa
- South Lamar (1607)-**1 business flooded**, 1', minor damage

### East Bouldin

- Barton Springs Road (801), Filling Station Restaurant,; **1 business flooded**, 1', flood bypass culvert inlet behind building was partially blocked by debris resulting in overflow into the building
- **11 Roadway bridges overtopped:** South 1<sup>st</sup> Street, West Elizabeth, West Monroe, West Annie, West Mary Street, West Johanna Street, West Live Oak Street, South 1<sup>st</sup> Street at Oltorf intersection, Cumberland Road, El Paso Street, and Havana Street
- **7 houses flooded:** 407 West Elizabeth (duplex), 414 West Annie (<1'), 416 West Annie (<1'), 420 (3-4 feet) and 422 West Johanna (<1'), 401 El Paso St., 501 West Live Oak.
- **4 Businesses flooded:** Eagle Body Shop 1602 S. First St. (1-2 feet), Pieces of the Past 411 W. Monroe St. and Austin Cotton Co. 409 W. Monroe (<1'), H. A. Guerrero Carpets at 2313 South 1st Street (<1').

### Carson Creek

- Hoeke Lane (2501): **1 house flooded**, <1', minor damage, fence damage at business park

### Fort Branch

- Eleanor Drive (1106): **1 house flooded**, 1', minor damage

### Little Walnut Creek

- Cedar Brook Court (3003)- **1 house flooded** from street overflow, < 1', minor damage

### Marble Creek

- Alum Rock Road at Colton Bluff Springs Road: severe erosion undermined culvert, **3 automobiles in Marble Creek waterway.**

### Onion Creek

- Onion Creek Forest North Area: **120 mobile homes flooded**, 1 to 3 feet, major damage-area generally bounded by South Pleasant Valley Road, Onion Creek Drive, Vine Hill Drive

### Onion Creek - (continued)

- Springville Lane Area: **250 houses flooded**, 1 to -2 feet, minor-major damage-area generally bounded by South Pleasant Valley Road, Springville Lane, Firefly Drive, Glow Worm Circle, Onion Creek Drive, Katydid Lane, and Wild Onion Drive
- Onion Creek Plantation Neighborhood: **1 house impacted by wind and water damage**. High water in Onion Creek and on Dixie Drive surrounded houses on Dixie Drive and Foy Circle
- East William Cannon Drive east of Pleasant Valley Road: Road overtopped, 100' feet of **pavement stripped off**

### Lower Shoal Creek

- 1200 N. Lamar-Town Lake: **20 businesses flooded**, 3'-4', 100+ automobiles flooded
- 5<sup>th</sup> Street, 6<sup>th</sup> Street and West Avenue bridges overtopped, 9<sup>th</sup> Street overtopped 3'; Lamar overtopped up to 4' from 19<sup>th</sup> Street south to 10<sup>th</sup> Street.
- Severe streambank erosion at 5<sup>th</sup> Street bridge and at Gaston Avenue
- 29<sup>th</sup> Street: Hike/Bike Trail surface swept away
- Additional damage to sanitary line and streambank adjacent to Lamar.
- Northwest Park sustained additional damage along East bank (detention pond)
- **Pembrook Trail (2601)-1 house flooded, 3', major damage**

### Middle Shoal Creek

- Ridgelea Neighborhood - Pete's Path/Bull Creek/Idlewild-**4 houses flooded** from street overflow, 1'
- Northland & Shoal Creek channel- **1 house flooded**, 1'
- Rosedale Neighborhood – residences request drainage study, **14 houses flooded**.

### Slaughter Creek

- Alcott Lane & Gwendolyn Avenue - **25 houses flooded**, 1-2', minor-major damage, flood damage to approximately 15 vehicles **One fatality**
- Road Damage on Gwendolyn just north of Alcott, Road Damage to Alcott at Gwendolyn
- Wommack Road (10300 Block)- **5 houses flooded**, 1', minor damage
- Old Manchaca Road (10300 Block) - **3 houses flooded**, <1', minor damage,
- Approximate 130-ft damage to concrete drainage culvert - concrete stripped from sides. Drainage ditch runs between 10314 and 10316 Old Manchaca Road

### Slaughter Creek (continued)

- Gail Road from Old Manchaca Rd to Riddle Rd - **10 houses flooded** on west side of street, 1', minor damage
- Riddle Road (2501). - **1 house flooded**, 1', minor damage
- Allred Drive (2200 Block) - **3 houses flooded**, 1', minor damage
- Lavendale Court- **3 houses flooded**, 1', minor damage

### South Boggy Creek

- Loganberry Drive (7611)- **1 house flooded**, <1', minor damage

### Tannehill Branch

- 12<sup>th</sup> @ E.M. Franklin: Culvert guardrail down.
- J.J. Seabrook Drive – 12 residences requested drainage study; at least **6 houses flooded**

### Taylor Slough North

- **Perry Lane (3105)**-1 house flooded, < 1', **minor damage**

### Taylor Slough South

- Maria Anna Street (2709, 2707)-**2 houses flooded**, < 1', minor damage

### Waller Creek

- Severe streambank erosion (100') between 3<sup>rd</sup> and 4<sup>th</sup> Streets
- Severe streambank erosion (200') between 4<sup>th</sup> and 5<sup>th</sup> Streets
- Failed retaining wall under hike and bike trail upstream of Red River
- **W. 34<sup>th</sup> Street (407)** 1 house flooded, 1'-2', **major damage**

### Walnut Creek

- Austin Hills Mobile Home Park: **1 mobile home flooded, 2 recreational vehicles flooded**, 1', some exterior **damage to 40 mobile homes**
- Crystal Brook Neighborhood: **9 houses flooded**, < 1', minor damage, -- Gunnison Pass, Millrace Drive, Coolbrook Drive, and general street flooding > 2'
- Waters Park Road: **1 business flooded**, 4.5', major damage

## Williamson Creek

- Cherry Creek Drive (5700, 5701, 5720, 5703)-**4 houses flooded**, 1-2', minor damage
- Burrough Drive/Cove (5613, 5611, 5609, 5612, 5607, 5605, 5603, 5601, 5903, 5901, 5807, 5805, 5803)-**13 houses flooded**, 1-2', minor-major damage
- Bayton Loop (5600, 5602, 5604, 5606)- **4 houses flooded**, 1-2', minor damage
- Blarwood Drive (6103-6113)-**6 houses flooded**, 1- 2', minor-major damage
- Coatbridge Drive (2700, 2701, 2703, 2702)- **4 houses flooded**, 1-2', minor damage
- Kings Highway -**4 houses flooded**, 1-2', minor-major damage
- St. George's Green- **4 automobiles flooded**
- Meadow Creek Circle (5303 & 5306)- **2 houses flooded**, 1-2' minor damage
- Meadow Creek Drive (5225-5243)- Outbuildings
- Radam Circle (1100-1102)-**2 houses flooded**, <1', minor damage
- Pawnee Pathway (4808)-**1 house, flooded**, <1', minor damage
- Wagon Bend Drive---Wind Damage to Trees
- Creek Bend Area: 4700 block of Creekbend Drive, **20 houses flooded**, 1'-3', minor to major damage
- Bannockburn Neighborhood – 35 residences request drainage study; at least **3 houses flooded**.

In addition to the damage to private property and lives in central Texas, catastrophic storms like the November 15<sup>th</sup> storm event create storm flow that scours the creek channels and causes changes to the channel that impact structures and property. Extensive inspection efforts after the storm have shown the southern watersheds in Austin were most affected by erosion and storm flow scouring, escalating the widening of streams, damaging private and public property.

Significant damage occurred long stream channels, and bank erosion escalated as a result of high-speed storm flows in various areas along Shoal, Williamson and Onion Creeks, putting property and structures at risk of collapse. In Shoal Creek near the 2800 block a sixty-foot area near Lamar Blvd. was severely scoured and funding resources are being reallocated to contain the erosion that threatens the roadway.



West 5<sup>th</sup> Street Bridge at Shoal Creek (looking south) November 16, 2001

The abutments of the 5<sup>th</sup> Street bridge over Shoal Creek are exposed by excessive storm water flows which scoured the streambank.

#### Texas Colorado Floodplain Coalition Membership

Watersheds do not follow political boundaries, however the effects of political decisions relating to land development in a floodplain may be felt throughout the watershed.

As a result of the devastating floods occurring from 1991 through 1998, the Lower Colorado River Authority (LCRA) initiated a series of meetings to find ways to improve the effectiveness of floodplain management coordination and cooperation in the lower Colorado River basin. A Steering Committee made up of representatives from the LCRA, the Cities of Austin and Wharton, and the Counties of Lampasas, Travis, Llano, Bastrop, and Fayette met for one year to develop a plan of action. After a year of study, representatives of 26 cities (including Austin) and counties in the basin

attended meetings and agreed to lead the effort to form a Floodplain Management Coalition.

The mission of the Coalition is to “encourage comprehensive consistent management of the floodplain along the Colorado River and its tributaries; provide a forum for data exchange; and facilitate a structured approach to managing the complex issues related to floodplain management.”

The Texas Colorado River Floodplain Coalition (TCRFC) has the following goals and objectives:

1. To create a consensus-based coalition that seeks mutually agreeable solutions to common floodplain management problems through a collaborative process;
2. To facilitate local floodplain management and emergency management program coordination;
3. To stabilize and reduce flooding risks, minimize property damage and loss of life through the effective and consistent enforcement of all applicable laws and by discouraging development in flood hazard areas and encouraging responsible development in the floodplain;
4. To develop and implement a plan to update and maintain Flood Insurance Rate Maps for the Coalition communities;
5. To establish a single entity partner with the state and federal floodplain and emergency management agencies;
6. To create a regional entity to coordinate with the Colorado River basin Congressional delegation, federal administration, state legislators, and others to accomplish the purposes of this Agreement;
7. To create an administrative structure through this Agreement to provide administrative functions and services for the Coalition and to provide a means for the Parties to negotiate agreements and obtain funding from state and federal agencies;

8. To assist the Parties with their training, technical assistance and public education needs with respect to floodplain management;
9. To create a mechanism for sharing ideas, programs and resources among the Parties;
10. To provide a public forum for floodplain management issues so that affected stakeholders and the public at large may have timely and meaningful notice and opportunity to comment on the activities of the Coalition;
11. To achieve or exceed, where appropriate, full and continuous compliance by the Parties with the National Flood Insurance Program (NFIP) and related state laws and regulations;
12. To encourage the Parties to coordinate other related programs such as the National Pollutant Discharge Elimination System (NPDES) stormwater permitting programs, on-site sewerage system programs, greenway and parks acquisition programs, and wetlands preservation programs with their floodplain management permitting program in order to achieve floodplain management goals; and
13. To encourage the consideration and use, where appropriate, of cost-effective alternatives to structural controls that may also provide recreational and environmental benefits including, but not limited to, the acquisition of open areas and significant wetlands through voluntary agreements with landowners, the acquisition of structures in the floodplain and their relocation, and the use of tax incentives and recognition programs.

Members of the Coalition agree:

1. To establish a training, education and technical assistance program to provide assistance to local floodplain management programs, and to include an education program for locally elected officials, regulated community and general public;

2. To develop a Floodplain Management Program Assessment Guidance Manual containing recommended floodplain development permitting criteria, flood damage mitigation measures, common assessment methodologies, common application forms that are consistent with NFIP requirements, model ordinances that meet NFIP requirements, and a discussion of cost-effective alternatives to structural controls that may also provide recreational and environmental benefits;
3. To have an independent review performed of the member community's ordinances or orders and floodplain management programs to assist the community in meeting, at a minimum, NFIP program requirements; and
4. At the request of another member community, to provide the same notice and opportunity to comment on a floodplain development permit application as provided to the general public;

Executive Committee Representatives from the City of Austin include Council Member Daryl Slusher, and Council Member Raul Alvarez is designated as an alternate representative. David Walker, Watershed Protection and Development Review Department, is serving as chairperson of the Middle Basin Technical Committee.

A preliminary community assessment of Austin's floodplain management programs was conducted by TCRFC in Spring 2002. Austin was identified as having the highest ranking of "excellent" floodplain management.

### ***Endangered Species Issues***

#### **Barton Springs Salamander**

In October 1998, the U.S. Fish and Wildlife Service (the Service) issued a Section 10(a)(1)(B) permit for the incidental take of the federally protected Barton Springs salamander (*Eurycea sosorum*) for the operation and maintenance of Barton Springs Pool and adjacent springs. Under the provisions of the permit, the City of Austin committed to implement a series of measures at Barton Springs Pool and adjacent

springs located in Zilker Park. These measures are designed to minimize and mitigate the level of incidental take of the salamander. Included in these measures is the installation of adjustable gates in the downstream dam, underwater cleaning equipment that reduces the need to lower the pool, and mitigation of surface stormwater runoff at Barton, Eliza, and Old Mill springs.

Barton Springs Pool was lowered seven times during the 2001 calendar year. During each lowering, WPDRD biologists were on-site to inspect all exposed areas of the pool for stranded salamanders. WPDRD biologists also inspect the other spring sites in Zilker Park for stranded salamanders when the pool is lowered. In 2001, the pool was lowered three times for cleaning and an evaluation of the adjustable gate system. The pool was also lowered four times during the year for flood mitigation. Flooding occurred on January 10, August 26, November 15, and December 8. The November 15 flood was by far the most severe resulting in damage to fencing, metal railings, the diving board, and the beach area. Most of the gravel and cobble on the beach area was swept downstream by the flood. Salamander habitat in the beach area was restored by WPDRD and PARD Aquatics staff after the November 15 flood. This restoration effort was approved by the Service. WPDRD and PARD Aquatics staff placed one hundred and fifteen cubic yards of gravel and cobble over approximately 10,000 square feet of the beach area to provide habitat for the re-colonization of aquatic macrophytes, invertebrates, and salamanders.

The November 15 flood also caused extensive damage to the Water and Wastewater sanitary lift station that is located under the parking lot at Barton Springs Pool, near the concession stand and train station. The lift station was inoperable for a period of one week but there was no indication that the sewage spill affected the salamander or its habitat in Eliza Spring and Barton Springs Pool.

WPDRD biologists are responsible for the monthly salamander surveys at Barton, Eliza, Old Mill and Upper Barton springs. During 2001, WPDRD biologists conducted seven regular surveys in Barton Springs Pool. Survey results ranged from 6 to 15 salamanders with a mean value of 11 salamanders. At Eliza Spring, nine surveys

were conducted in 2001. Survey results ranged from zero to seven with a mean value of four salamanders. At Old Mill Spring, biologists conducted ten surveys. Survey results for the Barton Springs salamander (*Eurycea sosorum*) ranged from 8 to 56 salamanders with a mean value of 28 salamanders. At Old Mill Spring, WPDRD biologists also surveyed for the newly described Austin Blind salamander (*Eurycea waterlooensis*). Survey results for the Austin Blind salamander varied from zero to 37 with a mean value of nine salamanders. WPDRD biologists conducted an additional survey in May 2001 of the spring-run below Old Mill Spring and the area of lower Barton Creek where spring water discharges into the creek. Biologists found a total of 13 Barton Springs salamanders. And at Upper Barton Spring, biologists conducted ten surveys in 2001. Survey results ranged from zero to 14 with a mean value of six salamanders.

Between January 28, 2002 and March 19, 2002, WPDRD biologists found a total of nine salamanders at Upper Barton Spring with a condition known as bubble trauma. Six of the affected salamanders died and three recovered in captivity. Two fish species at Upper Barton Spring also appeared to be affected. Over 15 Mexican tetras were found dead and several Mexican tetras and Gambusias were found to have abnormalities such as bulging eyes and/or bent tails. Four salamanders (2 dead and 2 live) and three fish have been sent to a pathologist for analysis. In addition, fish, salamander, and invertebrate tissue samples will be analyzed for a suite of chemicals. Water samples were collected by WPDRD and U.S. Geological Survey (USGS) at the Upper Spring site. USGS water sample analyses detected low levels of some solvents and pesticides. To date, water samples analyzed for possible sewage line spills in the area have been reported as negative. Results of the pathological analyses have not yet been received by the City. Possible causes of the gas bubble condition include supersaturation of the groundwater with dissolved gases, pollutants, and/or disease. Scientists with WPDRD, the Service staff, and USGS will continue to collect samples and monitor the situation at Upper Barton Spring.

In compliance with the measures detailed in the Habitat Conservation Plan (HCP), the City of Austin contributes \$45,000 annually to the Conservation and Research Fund

and \$20,000 annually for the development and implementation of the captive-breeding program for the salamander. Highlights of the 2001 captive-breeding program include establishing a temporary facility at the University of Texas' Animal Resources Center and adding a second full-time biologist to the captive breeding staff. Captive breeding biologists have been working with the University of Texas and City of Austin staff to identify a permanent location for the program. Since the Austin Blind salamander is now formally recognized as a distinct species, biologists have added the new species to the captive-breeding program. The City of Austin's captive breeding program currently supports 90 salamanders, including 76 Barton Springs salamanders and 14 Austin Blind salamanders. Four 2001 egg-laying events occurred in three Barton Springs salamander tanks, producing 37 young. To date, no eggs or other signs of reproductive activity have been observed in any wild or captive Austin Blind salamanders.

Since the Section 10(a)(1)(B) permit was issued in October 1998, the City of Austin has implemented major changes in pool maintenance and operational methods in order to decrease the level of incidental take of the federally protected Barton Springs salamander. The underwater cleaning equipment eliminates the need to lower the water level in the pool on a weekly basis, which can have a significant impact on the salamander and the biology of the springs. Aerial coverage of aquatic vegetation has also increased in the pool and aquifer levels remained above average throughout the year. However, salamander survey results at Barton Springs Pool for 2001 are lower than average based on the available survey data. Habitat conditions in Eliza Spring remained poor throughout 2001 with anoxic sediment and algae covering most of the bottom of Eliza Spring. The poor habitat conditions are reflected in the low salamander survey numbers. Old Mill Spring continues to provide excellent habitat for both the Barton Spring and Austin Blind salamanders. Survey results for both species indicate an abundance of salamanders with a high percentage of juveniles present.

The City of Austin is committed to the protection of the salamander and the Edwards Aquifer and compliance with the measures set forth in the Section 10(a)(1)(B) permit.

However, the City of Austin has met in informal consultation with the Service and will submit a Habitat Conservation Plan (HCP) amendment proposal to the Service in 2002 for adaptive management changes to the HCP. The goal of the HCP amendment is to improve the maintenance and operation of Barton and adjacent springs and provide the maximum protection for the continued survival of the species.

#### Jollyville Plateau Salamander

In the fall of 2000, the description of three new Central Texas species of *Eurycea* salamanders was published in Herpetological Monographs, No. 14. The three new described species are the Jollyville Plateau salamander (*Eurycea tonkawae*), the Georgetown salamander (*Eurycea naufragia*), and the Salado salamander (*Eurycea chisholmensis*). All three species occur north of the Colorado River and are considered a diverse group from species of *Eurycea* salamanders that are found south and west of the Colorado River.

WPDRD completed a two-year study of the Jollyville Plateau salamander in December 1998. A draft report documenting the results of the study was issued in October 1999. The report is titled "Jollyville Plateau Water Quality and Salamander Assessment" and it documents the relationship between physical, chemical, and biological factors that potentially affect the distribution and abundance of the species. To date, the report remains a draft document and the final report is scheduled to be published in 2002.

Biologists at the University of Texas, Texas Parks and Wildlife, Travis County, and the City of Austin have located 27 Jollyville Plateau salamander sites in the Shoal Creek, Walnut Creek, Bull Creek, Brushy Creek, Buttercup Creek, and Lake Travis watersheds. The number of sites is lower than previously reported (State of the Environment Report, April 2001) due to the consolidation of multiple sites in the same stretch of creek or spring run. All of the previously reported sites continue to support salamander communities. The number of salamander sites is expected to increase during 2002 with presence/absence surveys scheduled to be conducted on additional Balcones Canyonlands Preserve acreage recently acquired by Travis County. WPDRD and PARD Preserves biologists will assist Travis County Preserves staff with

the presence/absence surveys. City biologists continue to monitor three sites on a monthly basis and one site on a quarterly basis.

The ad hoc committee formed by the Service in the summer of 1999 did not meet during the 2001 calendar year. City management and staff continue to evaluate the possibility of developing a separate conservation strategy and conservation agreement with the Service for the long-term protection and survival of the species. Of the three newly described northern *Eurycea* salamander species, only the Georgetown salamander has been added to the Candidate Species List by the Service. The Jollyville Plateau salamander was proposed to be added to the list in 2001, but the Service declined to promote the species to candidate status.

## **Section 2**

### **Air Quality**

#### ***Assessment***

Air quality in the Austin-San Marcos Metropolitan Statistical Area (MSA) (Bastrop, Caldwell, Hays, Travis, and Williamson counties) is threatened and area residents are at risk for corresponding negative impacts on aesthetics and health. In 1999, the amounts of ground-level ozone recorded at regional monitoring sites exceeded the maximum amount allowed under the proposed ground-level ozone standard of the Federal Clean Air Act. For violating this standard, the region could be subject to a nonattainment designation by the U.S. Environmental Protection Agency when final rulemaking is complete.

#### ***Air Quality***

Clean air is a vital aspect of the quality of life in the Austin region, and air quality statistics impact Austin's reputation for "livability". Poor air quality creates aesthetic concerns such as reduced visibility and an unsightly green or brown haze. It damages property including buildings, vehicles, and flora. Most importantly, air pollution is a health hazard, especially for the very young, athletes who exercise outdoors, and the elderly.

As this region has evolved from a medium-sized city surrounded by rural land and distinct small towns into a metropolitan area of more than one million people, local activities that pollute the air have also increased. These activities include the number of vehicle miles traveled (VMT), the use of polluting landscaping machinery, the construction of buildings and infrastructure, industrial emissions, and power generation by fossil fuels. Air quality in the Austin region is also affected by similar activities in other metropolitan areas. Data collected at regional monitoring sites indicate that the air moving into this region can be just as polluted as the air moving out.

Different communities have different air quality concerns. The U.S. Environmental Protection Agency (EPA) has established standards for six air-borne pollutants: ground-level ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, respirable particulate matter, and lead. In Austin, the pollutant of primary concern is ground-level ozone. Ground-level ozone is created when oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOCs) react in sunlight, especially on hot, still days. Higher in the atmosphere, ozone is actually beneficial, as it shields the earth from ultra-violet radiation. At ground level, ozone has adverse environmental and health impacts.

Ozone is not directly emitted. It takes time to form and therefore concentrates in areas downwind from the sources of its components. Figures 2-1 and 2-2 illustrate ozone concentrations in Central Texas on a typical summer day (2:00 p.m. on July 12, 1995, as predicted by the University of Texas using an urban airshed model). In the Austin region, the prevailing winds are from the southeast. One can see that high concentrations of ozone occur as a “plume” downwind from (northwest of) major component-source areas (downtown, power plants, etc.).

Ground-level ozone is typically measured in parts per billion (ppb) of ozone concentrated in the ambient air. The proposed Federal standard focuses on ozone concentrations averaged over eight hour blocks. EPA recommends a national eight-hour standard of 85 ppb as the violation point. To assess a region’s violation status, regulators will analyze three years of data, identify the fourth highest eight-hour reading for each year, and average those three readings. If the three-year average is 85ppb or higher, EPA could designate the region as nonattainment for ozone. This standard is currently being challenged in Federal court.

Prior to 1997, EPA measured only one-hour ozone concentrations, with 120 ppb as the violation point. Regions with more than three exceedances in a three-year period were subject to nonattainment designation. Austin is not in violation of the one-hour standard. However, based on data collected from 1997 to 1999, the region fell out of compliance with the proposed eight-hour standard. Current data shows that we remain in violation of that standard.

Figure 2-1

### Peak 1-hr average ground-level ozone

Wednesday July 12th, 1995 14:00 hours

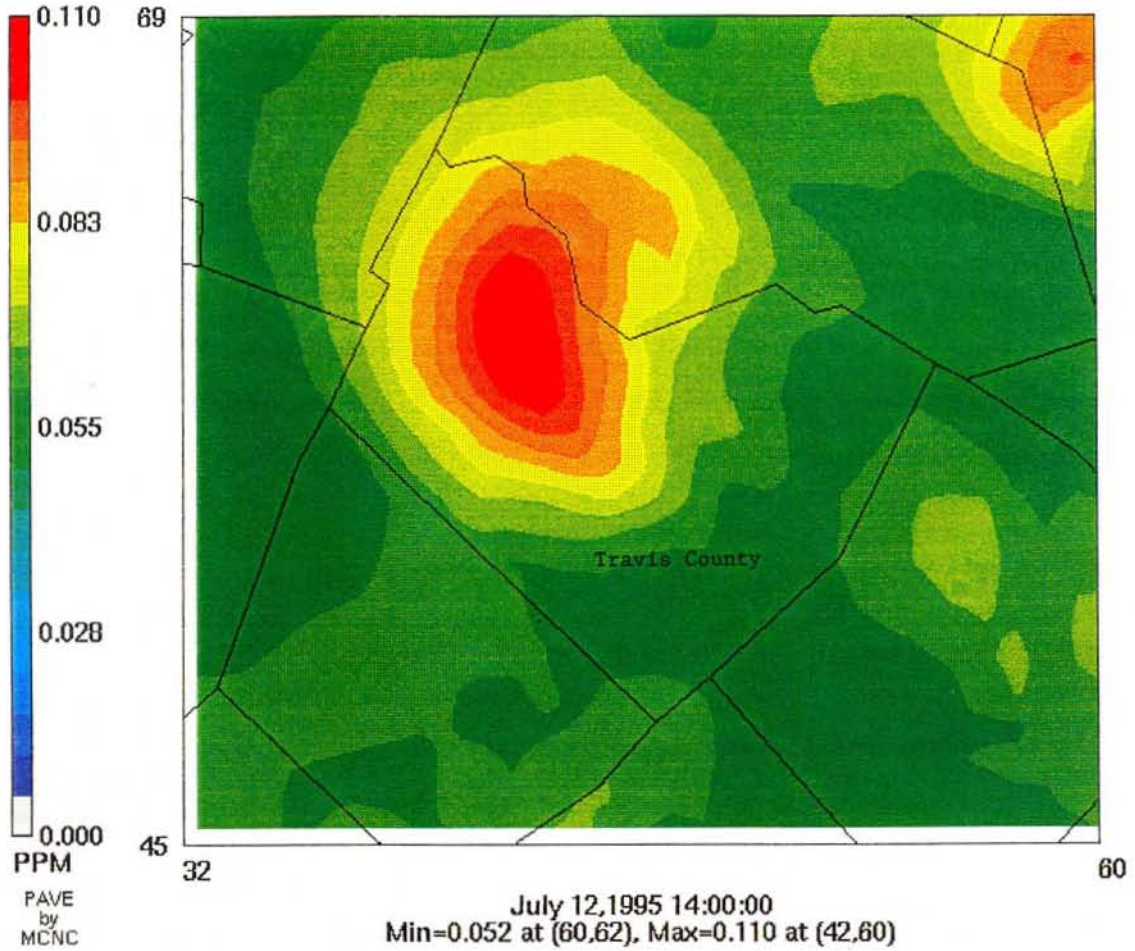
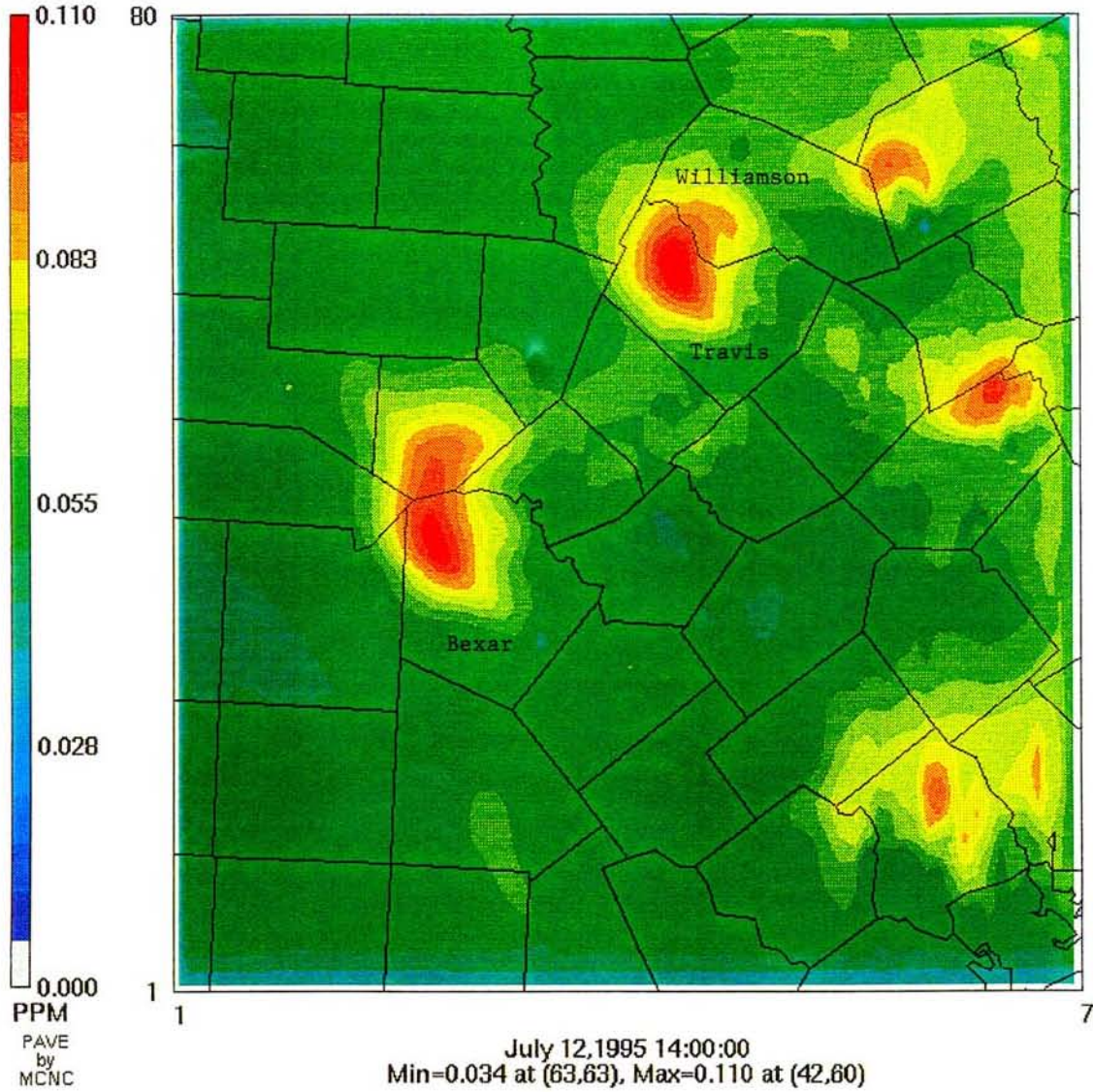


Figure 2-2

### Peak 1-hr average ground-level ozone

Wednesday July 12th, 1995 14:00 hours



EPA’s proposed standard is described as “health-based” and responds to improved knowledge about the effects of ozone on human health. The elderly, children, athletes, and asthmatics are particularly vulnerable to the effects of ozone because it reduces lung capacity. The American Lung Association reports that hospital admissions increase during periods of high ozone. The National Center for Health Statistics note that hospitalization rates for asthma increased 167% between 1972 and 1997. Further, the number of asthmatics is increasing: from 1982 to 1995, the number of Americans diagnosed with asthma increased 63.2% and childhood asthma is up even more. The American Lung Association now recommends that humans should not be exposed to an eight-hour ozone concentration average of greater than 70 ppb.

### Where We Are Monitoring

The Austin-San Marcos MSA has three Continuous Air Monitoring Stations (CAMS) which provide the official recordings of air pollution levels to the Texas Natural Resources Conservation Commission (TNRCC). CAMS #3, “Austin Northwest,” is at 3724 North Hills Drive, near the intersection of MoPac and Far West Blvd. CAMS #38, “Audubon,” is west of Cedar Park at 12200 Lime Creek Road. CAMS #62, “San Marcos Airport Drive,” is at 2041 Airport Drive in San Marcos. (see map 1)

Number of days with eight-hour ozone readings  $\geq$  85 ppb:

Year	C3 Austin Northwest	C38 Audubon	C62 San Marcos
1999	8	38	1
2000	6	9	3
2001	0	1	0

Highest eight-hour ozone readings:

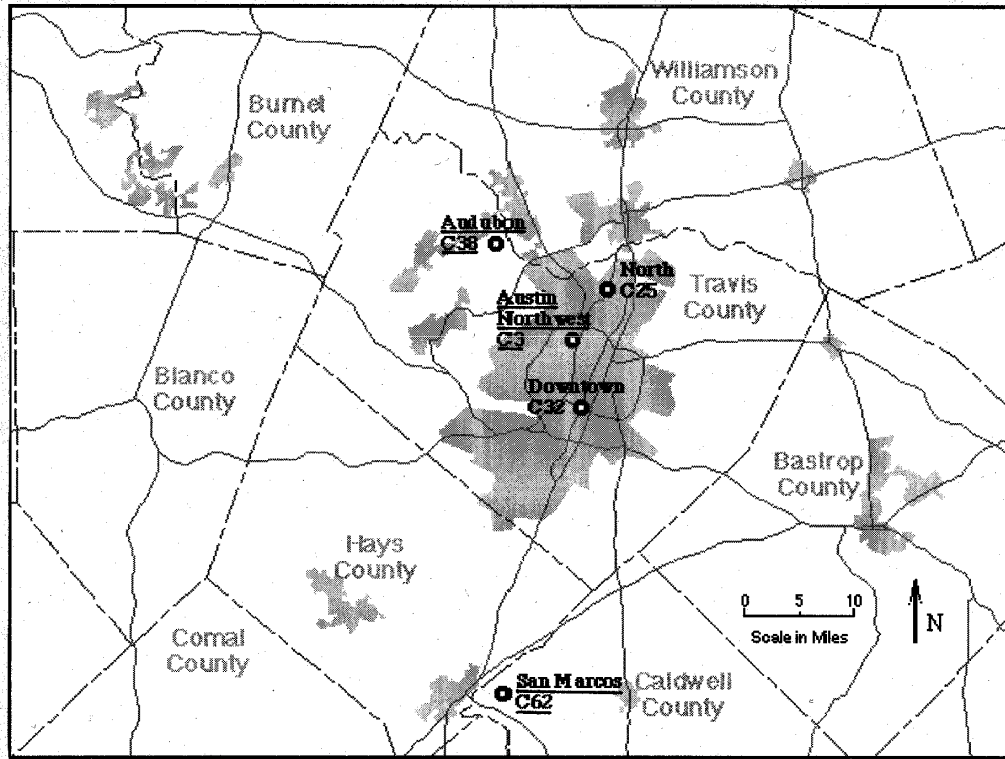
Year	C3 Austin Northwest	C38 Audubon	C62 San Marcos
1999	91	103	86
2000	93	100	94
2001	84	85	80

Fourth highest eight-hour ozone readings and three-year averages:

Year	C3 Austin Northwest	C38 Audubon	C62 San Marcos
1999	87	99	79
2000	88	87	84
2001	78	80	75
Three-year average	84.3	88.6	79.3

map 1

## Air Quality Monitoring Stations in the Austin Area



Active monitoring stations are underlined.  
Others are inactive. There is historical data for the inactive sites.

Source: Texas Natural Resource Conservation Commission  
[http://www.tnrcc.state.tx.us/cgi-bin/monops/daily\\_info?reg:11](http://www.tnrcc.state.tx.us/cgi-bin/monops/daily_info?reg:11)

Ozone formation is sensitive to meteorological conditions. During the summer of 1999, when weather patterns were conducive to ozone formation, we experienced a spike in the number and severity of high ozone days. More favorable breezes marked the summer of 2001 and we had an extremely mild ozone season. But weather is not the only factor in ozone formation; NO<sub>x</sub> and VOCs must be present. Austinites can't change the weather, but they can reduce their production of NO<sub>x</sub> and VOCs.

### What We Are Doing

The City of Austin (COA) staff have developed ten strategies that are designed to ensure that the COA exercises leadership and sets a positive example for the community by minimizing the amount of NO<sub>x</sub> and VOC emissions that results from the COA's daily operations. These strategies include actions to be undertaken by individual entities as well as actions involving coordination among two or more organizations. The ten strategies have been designed not only for COA operations, but also to serve as a template for duplication by other local governments and businesses. These strategies include:

- Voluntary transportation control measures for employees;
- Reductions in emissions from fleet vehicles;
- Reductions in emissions related to traffic congestion;
- Reductions in emissions through contractual agreements;
- Programs to encourage Smart Growth initiatives;
- Enhanced public education programs;
- Development of regional partnerships;
- Reductions in emissions from mobile sources;
- Reductions in emissions from non-road mobile sources; and
- Reductions in emissions from area and point sources.

At the direction of the City Manager every COA department has in place a departmental Ozone Action Day Plan. The plans guide air-friendly operational changes made on ozone action days or, for some departments, for the entire ozone season. While each plan is department-specific, all the plans call for employee notification of upcoming ozone action days and all plans aggressively promote employee trip reduction measures.

As part of its commitment to the use of cleaner-burning fuels, COA is now the host agency for the Central Texas Clean Cities program. Clean Cities is a voluntary Federal program designed to accelerate and expand the use of alternative fuel vehicles (AFVs) in communities throughout the country and to provide refueling and maintenance facilities for their operation. Sponsored by the United States Department of Energy (DOE), Clean Cities encourages local governments and organizations to form public/private partnerships in developing markets for AFVs. The overall goal of the Clean Cities program is "to promote and encourage use of alternative fueled vehicles in significant quantities, with essential refueling and maintenance infrastructure, in an economically self-sustaining manner."

### Region-Wide Efforts

The COA recognizes the regional nature of air quality problems and takes an active role in area initiatives. In conjunction with the CLEAN AIR Force of Central Texas the COA helps sponsor annual public outreach campaigns. As a member of the Commute Solutions Coalition the COA promotes trip reduction strategies to area employers. But the centerpiece of the COA's regional outreach is its work with the Clean Air Coalition of Central Texas (CACCT) and the development of the O<sub>3</sub> Flex plan.

O<sub>3</sub> Flex is a program EPA has designed for areas that, while approaching nonattainment status, are not yet in formal violation of the ground-level ozone standard. The program, which is completely voluntary, allows elected officials to select and implement the ozone reduction measures best suited to their communities' needs and resources. It is designed so that communities can begin to solve air quality problems before those problems become more severe.

Elected officials from throughout the five-county Austin-San Marcos MSA formed the CACCT, the group charged with developing the area's O<sub>3</sub> Flex plan. The plan, which catalogues and quantifies the region's voluntary emission reduction measures, will have a formal signing ceremony and be presented to EPA on March 28, 2002. It will be the first completed O<sub>3</sub> Flex plan in the nation and is considered a model of community cooperation and vision.

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## **Section 3**

### **Solid Waste and Hazardous Disposal**

#### ***Solid Waste***

##### **Diversion Rate**

In FY00/01, the waste diversion rate decreased slightly to 28.23% from 28.47% the previous year. Although there was an increase in recycling collected per household and a smaller increase in garbage collected per household, there was also a decrease in yard trimmings per household, bringing the overall diversion rate slightly down. This decrease is attributed to the very high temperatures and lack of rainfall experienced during July, August and September of 2001.

##### **Commercial and Multi-Family Recycling Ordinance**

Solid Waste Services (SWS) administers this ordinance that took effect in April of 1999. Annual recycling volumes reported by properties affected by this ordinance indicate that to date, 98,318 tons of material has been recycled.

##### **Research Projects**

This past year, Solid Waste Services conducted two pilot projects that focused on providing greater diversion opportunities for the citizens of Austin. From September 2000 to January 2001, Solid Waste Services conducted 'Project Boxboard', a pilot program where boxboard was collected from approximately 15,000 households on five different yard trimmings routes that together were roughly representative of Austin's demographics. By means of educational flyers distributed door-to-door, residents were asked to set out boxboard in paper grocery bags, which were collected by yard trimmings trucks. These trucks delivered the boxboard, mixed with yard trimmings, to the City's Dillo Dirt operation for composting. The results of the pilot showed low participation and problems inherent with collecting boxboard with yard

trimmings, although no major problems were detected with composting the boxboard. The program was not implemented citywide, but other collection alternatives for boxboard will be examined in the future.

Solid Waste Services also administered the Sixth Street Recycling Pilot, a six-month pilot program from February to July of 2001 to study the feasibility of contracting additional recycling services to the Sixth Street Entertainment District.

The Sixth Street Recycling Pilot showed that cardboard recycling can be successful in the district, with 11 tons of clean, saleable cardboard recovered from a pilot alley over the duration of the pilot. A number of issues were associated with glass recycling during the pilot program. Although 20.44 tons of glass was collected, about 50% of it experienced contamination in the form of food waste and other trash. A Task Force appointed by the City Manager will be looking at these issues and will consider alternatives to divert this waste from the landfill.

### Recycling Participation Survey

The fourth annual Recycling Participation Survey conducted over four weeks from October to November of 2001 showed that 73.5 % of our customers recycle, up from 67.0 % in 2000. The survey consists of drive-by inspections of setouts in five representative neighborhoods, over a period of four weeks. The Recycling Participation Rate is defined as the percentage of households that set out recycling at least once during the four-week period. The Set-Out Rate is the percentage of households that set out on any given week. The weekly Set-Out Rate for recycling remained statistically unchanged. This indicates that, although more households are recycling, customers are taking longer between setouts, perhaps waiting for their recycling bins to be full before setting them out. This bodes well for collection efficiency.

City of Austin, Solid Waste Services  
Waste Stream Diversion Rate

**RESIDENTIAL CURBSIDE COLLECTION**

FISCAL YEAR	RESIDENTIAL HOUSEHOLDS	Garbage (TONS)	Curbside Recycling (TONS)	Yard Trimmings (TONS)	TOTAL TONS	DIVERSION RATE
FY 91-92	112,400	128,333	13,899	0	142,232	9.77%
%		90.23%	9.77%	0.00%	100.00%	
FY 92-93	121,100	125,881	16,535	510	142,926	11.93%
%		88.07%	11.57%	0.36%	100.00%	
FY 93-94	123,300	122,000	22,428	4,858	149,286	18.28%
%		81.72%	15.02%	3.25%	100.00%	
FY 94-95	125,300	114,067	22,732	11,307	148,106	22.98%
%		77.02%	15.35%	7.63%	100.00%	
FY 95-96	127,200	118,298	21,340	9,735	149,372	20.80%
%		79.20%	14.29%	6.52%	100.00%	
FY 96-97	131,200	113,059	24,776	14,133	151,969	25.60%
%		74.40%	16.30%	9.30%	100.00%	
FY 97-98	132,000	107,272	26,107	18,242	151,621	29.25%
%		70.75%	17.22%	12.03%	100.00%	
FY 98-99	134,643	108,228	26,104	15,593	149,925	27.81%
%		72.19%	17.41%	10.40%	100.00%	
FY 99-2000	136,200	109,242	26,797	16,686	152,725	28.47%
%		71.53%	17.55%	10.93%	100.00%	
FY 2000-01	141,015	115,268	28,594	16,747	160,609	28.23%
%		71.77%	17.80%	10.43%	100.00%	

**RESIDENTIAL BRUSH / BULKY COLLECTION**

FISCAL YEAR	RESIDENTIAL HOUSEHOLDS	Disposed Bulky (TONS)	Recycled Bulky (TONS)	Brush (TONS)	TOTAL TONS	DIVERSION RATE
FY 93-94	123,300	4,125	607	519	5,251	21.44%
%		78.56%	11.56%	9.88%	100.00%	
FY 94-95	125,300	4,605	660	1,136	6,401	28.06%
%		71.94%	10.31%	17.75%	100.00%	
FY 95-96	127,200	3,937	463	1,690	6,090	35.35%
%		64.65%	7.60%	27.75%	100.00%	
FY 96-97	131,200	6,062	649	1,977	8,688	30.23%
%		69.77%	7.47%	22.76%	100.00%	
FY 97-98	132,000	3,814	485	1,309	5,607	31.98%
%		68.02%	8.64%	23.34%	100.00%	
FY 98-99	134,643	4,638	1,450	1,823	7,911	41.37%
%		58.63%	18.32%	23.05%	100.00%	
FY 99-2000	138,700	4,472	935	2,081	7,488	40.28%
%		59.72%	12.48%	27.79%	100.00%	
FY 2000-01	143,803	6,564	1,330	3,175	11,069	40.70%
%		59.30%	12.01%	28.68%	100.00%	

**ON THE JOB RECYCLING**

FISCAL YEAR	SITES	WHITE PAPER (tons)	MIXED PAPER (tons)	CORRUGATED (tons)	COMMINGLED (tons)*	ALUMINUM (tons)	TOTAL TONS
FY 92-93	5	16.24	NA	NA	NA	0.29	16.53
FY 93-94	12	117.00	NA	NA	NA	2.41	119.41
FY 94-95	26	65.40	221.25	14.57	NA	3.83	305.05
FY 95-96	208	0.31	650.73	0.59	NA	3.79	655.42
FY 96-97	206	0.00	745.36	3.51	NA	3.10	751.97
FY 97-98	265		712.64		NA	2.00	714.64
FY 98-99	262		700.31		54.99		755.30
FY 99-2000	262		782.59		72.95		855.53
FY 2000-01	262		598.00		34.00		632.00

\* Commingled includes: aluminum, tin/steel, glass and plastic containers

**COMMERCIAL MULTI-FAMILY RECYCLING ORDINANCE VOLUMES**

QUARTER	M-F Paper (tons)	M-F Commingled (tons)	Total M-F (tons)	Commercial Paper (tons)	Commercial Commingled (tons)	Total Commercial (tons)	Total M-F & Commercial (tons)
FY 98-99	717	170	887	13,995	61	14,056	14,943
FY 99-00	2,165	490	2,655	29,935	53	29,988	32,643
FY 00-01	2,333	509	2,842	42,891	4,999	47,890	50,732

#### Other Participation Survey findings:

- Yard Trimmings participation increased by 2.8 % to 25.4 % with weekly setout rate remaining constant.
- Extra Garbage participation decreased by 0.7 % to 12.6 % while the percentage of extra garbage without stickers decreased by 7.9 % to 77.6 %.

#### Landfill Survey

Pursuant to Council Resolution the SWS Planning and Research staff conducted a two-day, eight-hour survey of local landfills. The survey was conducted to determine the amount of refuse originating in Travis County. Landfill sites participating in the survey were Texas Disposal Systems located on FM1327 East, BFI located on Giles Road and Hwy 290 East, and Waste Management (WM) located on Giles Road and Hwy 290 East.

#### Results\*

- 2,335 tons of refuse was recorded as originating outside of Travis County as compared to 6,275 tons credited to Travis County.
- The results of the two-day sampling indicated that 72.7% of the refuse collected originated in Travis County.

\*Because the sample size is so small, the results of this survey are not statistically significant or indicative of any trend or average. They are best viewed as a single data point.

Additionally, the base information was calculated based on the “opinion” of the drivers about the percentage of their load originating in and out of Travis County.

## ***Hazardous Waste***

### Household Hazardous Waste

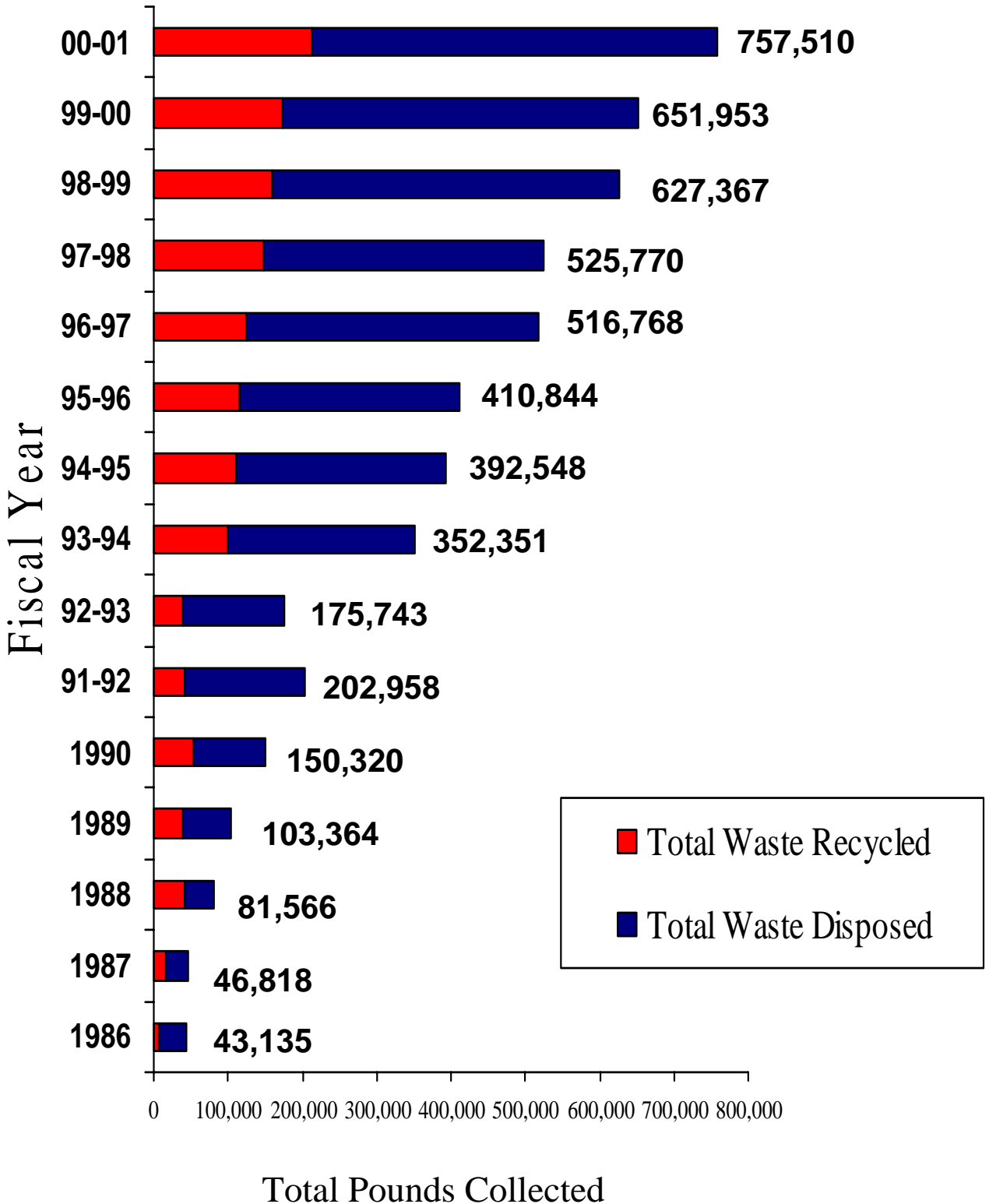
The City of Austin started collecting household hazardous waste (HHW) at annual collection events in 1986. Participation grew from 450 households generating 37,000 lbs. of hazardous waste in 1986 to 1,750 households generating 97,000 lbs. of hazardous waste in 1990. This material was diverted from solid waste or sanitary and storm sewer streams to recycling or proper treatment and disposal at EPA-permitted hazardous waste treatment facilities. In 1991 the City completed construction of a permanent HHW Collection Facility. For two years, the HHW Facility was open on one Saturday every other month for home chemical collection. Participation again increased to 3,300 homes generating 200,000 lbs. of hazardous waste in 1992.

In 1993-1994, the Solid Waste Services Department began weekly (Wednesday, 12:00 p.m. to 7:00 p.m.) collections. The City of Austin HHW Program completed its sixth year of weekly collections in September, 1999. Over 40,700 households (7,880 in 1998-99) were serviced in those six years, diverting over 2.1 million pounds (627,367 in 1998-99) of hazardous waste (Tables 3-1 and 3-2). On January 4, 2000, this program moved into its new larger facility at 2514 Business Center Drive and implemented a twice-weekly collection schedule (Tuesdays and Wednesday, 12:00 p.m. to 7:00 p.m.). During Fiscal Year 2000-2001, this program serviced 6,773 households and diverted 757,510 pounds of household hazardous waste. Tables 3-1 through 3-3 provide an overview of annual waste volumes collected, participation levels, and historical results of the Household Hazardous Waste Program.

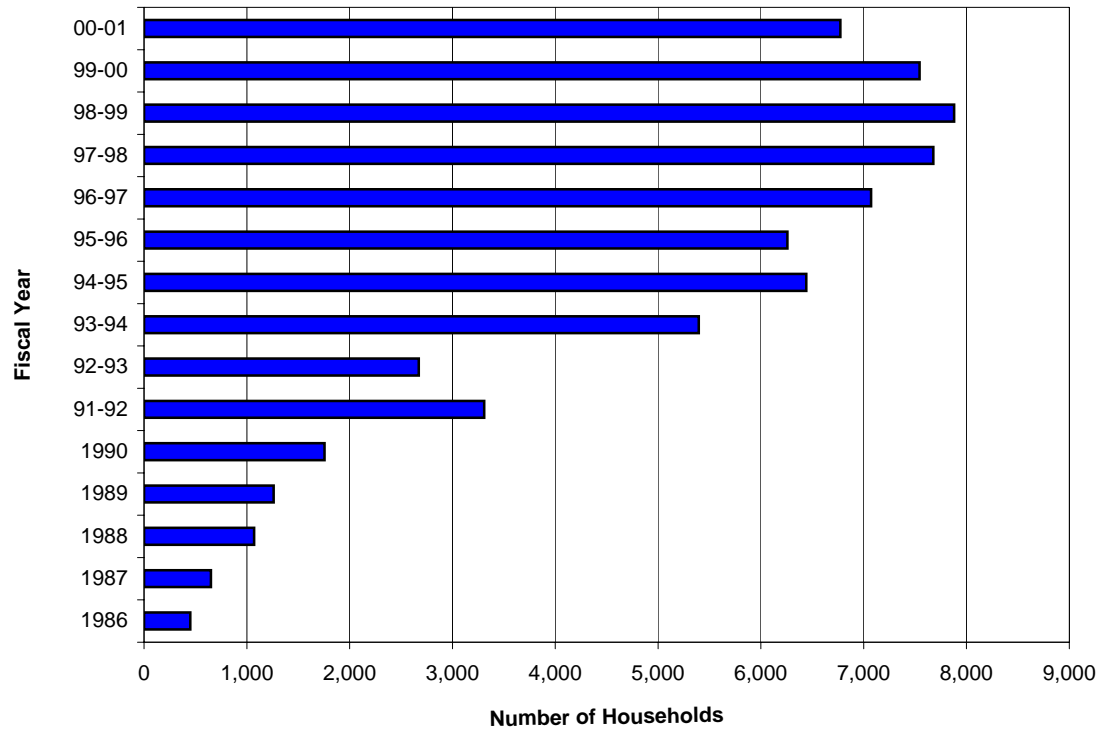
If this waste were not collected, it would remain in people's homes or be discarded with the risk of injury and/or pollution through the solid waste stream, wastewater, or even storm sewer. The City's HHW has serviced over 66,000 households and collected over 4.7 million

Table 3-1

## Total Household Hazardous Waste Collected (Fiscal Year 1986-2001)



**Table 3-2  
HHW PROGRAM PARTICIPATION FY 1986 - FY 2001**



**Table 3-3**

**HOUSEHOLD HAZARDOUS WASTE COLLECTION PROGRAM**

**HISTORICAL RESULTS  
FY 1986 - FY 2001**

	1986	1987	1988	1989	1990	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	TOTAL
Households	450	650	1,070	1,260	1,755	3,308	2,672	5,395	6,441	6,258	7,072	7,677	7,880	7,544	6,773	66,205
Volume HHW (pounds)	36,885	29,508	41,065	63,934	97,190	160,214	137,290	249,956	281,673	295,773	362,000	423,862	496,920	651,953	757,510	4,085,733
Waste Oil Recycled (gallons)	600	1,300	2,600	3,400	3,850	3,255	3,110	6,520	5,960	6,950	9,590	9,530	10,339	8,650	11,080	86,734
Lead Acid Batteries	50	216	600	398	693	393	271	686	624	724	741	844	1,063	802	817	8,922
Recycled Latex Paint (gallons)	N/A	N/A	N/A	N/A	N/A	416	513	2,240	3,270	3,095	4,045	3,040	5,912	7,563	18,065	48,159
Disposal Cost	\$ 59,194	\$ 59,286	\$ 61,776	\$ 98,823	\$ 150,000	\$ 358,535	\$ 299,993	\$ 254,720	\$ 230,610	\$ 271,296	\$ 218,622	\$222,982	\$274,490	\$313,212	\$319,563	\$3,193,102
Disposal Cost/Household	\$132	\$91	\$58	\$78	\$85	\$108	\$112	\$47	\$36	\$43	\$31	\$30	\$32	\$41	\$47	\$48 (average)
Total Cost/Household	\$180	\$145	\$91	\$118	\$135	\$136	\$156	\$75	\$70	\$75	\$62	\$64	\$54	\$71	\$98	\$102 (average)

# Volume of Waste Received

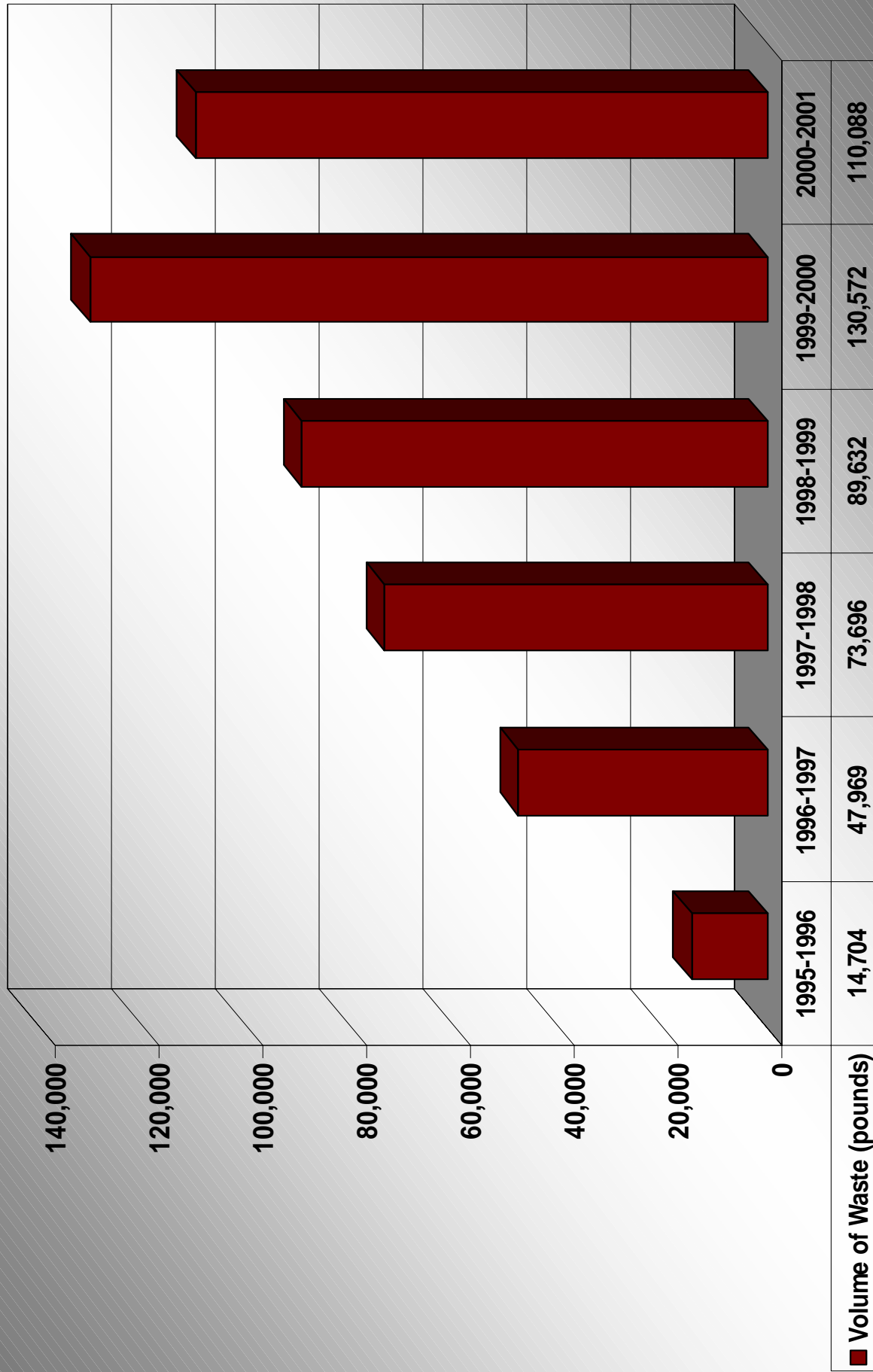


Table 3-4

pounds of household hazardous waste for recycling or proper disposal, since the program's inception in 1986. Not only has this program safely diverted hazardous waste from improper dumping, the landfill, and wastewater systems, but it substantially increases the safety of solid waste workers who may be exposed to such chemicals during garbage collection or at the landfill. The overall purpose of the program is also to increase the public's awareness of the hazards of these materials at home and in the waste stream, and to encourage alternative behaviors that will lead to wiser use of such materials and reduction in the generation of these wastes.

Although overall HHW budgetary costs have increased significantly since 1986, the overall program cost per participating household is less than \$110.00. (Table 3-3). Disposal costs per household have been reduced from \$132.00 to approximately \$50.00 largely through hands-on management (bulking compatible materials, decanting aerosols, crushing paint cans, etc.) and enhanced recycling (various batteries, antifreeze, paint, etc.). In addition, the HHW Program coordinates a household battery recycling program with collection at a number of retail outlets throughout the City, so customers can deposit old batteries when they buy new ones. Although it is not practical to keep count of households recycling batteries at retail and school outlets, the number probably exceeds several thousand annually.

One of the most successful recycling ventures is the recycled latex "Old Paint." Good quality latex paint is segregated, bulked, and shipped to a paint plant in the Austin area. The paint is reblended to a good quality specification, containerized, and picked up by the HHW Program for distribution to community improvement projects and low-income housing building or refurbishing. Since 1993/1994, nearly 25,000 gallons of paint have successfully been reblended and distributed to worthwhile projects, including those completed by Habitat for Humanity, Casa Verde Builders, and Urban Youth Corps. Recycling paint has saved the HHW Program over \$200,000 in disposal costs and has conservatively contributed over \$250,000 in material costs in the five years. The Capital Area Corporate Recycling Council awarded the "Old Paint" Recycling Program a first place "Closing The Loop" award in 1996. Relocating to the new facility has allowed for the opening of a Product Reuse Center where citizens can obtain new or unused material. This material includes paint and paints products,

automotive products, cleansers, and garden products (excluding restricted or prohibited pesticides). During Fiscal Year 2000-2001, the product reuse efforts diverted over 52,105 pounds of new or unused products, saving over \$10,722 in disposal costs.

The HHW Program is open to City of Austin and Travis County residents outside the City Limits. Participation and hazardous waste volumes collected in the HHW Program continue to increase and probably will for some time. The City of Austin's HHW Program is the first of its kind in the State of Texas. It has received regional and national recognition, including the EPA Regional Administrator's Award for Environmental Excellence for Outstanding Non-point Source Pollution Prevention in 1992, and Keep America Beautiful, Inc. National Recycling Award in 1995. In 1994, the National HHW Conference selected Austin as its host City, and over 400 HHW managers/staff from around the nation have visited the City's Facility and observed its operation.

### Small Business Hazardous Waste Disposal Program

The Solid Waste Services Department offers hazardous waste disposal services to small business. Developed in mid-1996, this program provides an environmentally safe and convenient option for businesses to dispose of unwanted hazardous waste streams. The program is limited to those businesses generating less than 220 pounds of hazardous waste in a month (classified as Conditionally-Exempt Small Quantity Generator), and disposal costs are borne by the business utilizing the service.

A major problem that small business encounter when having to dispose of hazardous waste is that the volume generated is not sufficient to obtain service from a licensed hazardous waste disposal company. In some instances, the licensed companies have provided the service, but at a cost that is prohibitively expensive. When these instances arise, business options are limited and usually involve improper or illegal storage or disposal. During 2000-2001, this program serviced over 242 businesses with hazardous waste disposal services and disposed of over 10,088 pounds. Since the program development in mid-1996, over 800 businesses have utilized this service and disposed of over 475,000 pounds of hazardous wastes. Table 3-4 and Table 3-5 detail the annual growth in both pounds of hazardous waste disposed and

businesses serviced since this program inception in 1996. This program serves as a model for other municipalities wanting to provide similar services to their small business community.

## Electronics Recycling

On November 4, 2000, Solid Waste Services conducted the first-ever collection for the recycling of computer equipment. The purpose of this collection was two-fold; to bring to light the challenges associated with the improper disposal of computer equipment, and the opportunities available for recycling of this valuable product. Solid Waste Services also wanted to give homeowners an opportunity to rid themselves of unwanted, obsolete or damaged equipment. A second collection event was held on November 4, 2000. During the two collection events, over 20,000 pounds of computer equipment was collected from nearly 400 households. To address this issue in the long-term, a network of electronics recyclers in the Austin area were identified and advertised to the public so that their services could be utilized by the public throughout the year, rather than having to wait for a once- or twice-yearly collection event.

# Number of Businesses Utilizing Disposal Services

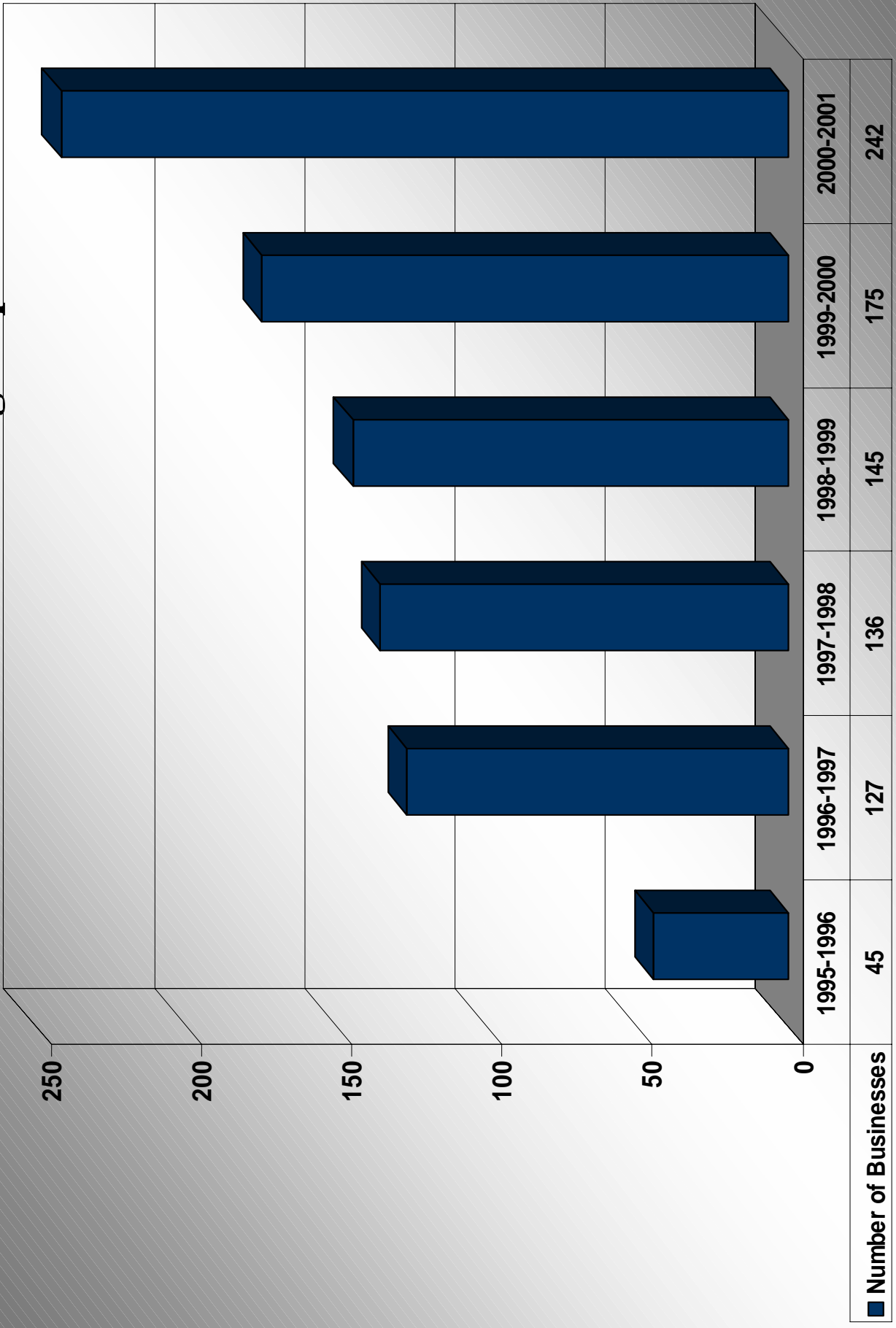


Table 3-5

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## **Section 4**

### **Water Supply, and Wastewater Service**

#### ***Water Supply / Conservation***

Water consumption in the Austin area has steadily increased over the years due to consistent growth in the entire Central Texas region. The City of Austin Water and Wastewater Utility supplies water within its boundaries and in a number of surrounding areas. The size of Austin's water service area continues to grow, and even the existing service area could accommodate substantial population growth for decades in the future.

In October 1999, the City of Austin supplemented its ample state-adjudicated water rights with additional water reserves purchased from the Lower Colorado River Authority (LCRA) through a new water supply agreement. These combined supplies, backed by firm storage in the Highland Lakes, in conjunction with water reclamation and conservation are expected to meet demands for raw water within Austin's service area through the next 50 years.

However, capacity in Austin's water treatment and distribution facilities has been strained in recent years. Water use increased to its highest maximum usage ever with 244 million gallons per day (MGD) in 2001. Two key system improvement projects, the Ullrich Medium Service 72-inch Transmission Main and the Ullrich Water Treatment Plant Capacity Upgrade to 100 (MGD), were completed in the fall of 2000. However, necessary pipe joint repairs in the 72-inch transmission main have caused a delay in placing the main fully in service until just prior to the summer of 2002. By the summer of 2002, if the Howard Lane Pump Station and transmission mains and repairs to the Ullrich 72-inch transmission main are completed as scheduled, the water system will have a peak day capacity of 260MGD. No additional capacity will be added until 2005 when the next expansion to the Ullrich Water Treatment Plant is scheduled to be completed.

The following chart shows the history of peak day water usage in Austin.

<b>Fiscal Year</b>	<b>Peak Usage (MGD)</b>
94 – 95	191.3
95 - 96	195.7
96 – 97	191
97 – 98	206.4
98 – 99	211.2
99 – 00	220.3
00 - 01	244

In addition to planned capacity and distribution improvements, the City has implemented comprehensive conservation and reclaimed water programs with the following goals.

1. Reduce peak day use by 20 million gallons per day through a combination of demand reduction and reclaimed water substitution:

**Benefit:** The City will be able to delay construction of water and wastewater treatment capacity.

2. Reduce customer demand by a total of 50,000-acre feet (AF) by 2050 through a combination of demand reduction and reclaimed water substitution.

**Benefit:** The City will not have to purchase additional water supplies, which would be extremely costly.

3. Delay reaching a total water demand of 201,000 AF as long as possible.

**Benefit:** Since the City prepaid the LCRA for water up to 201,000 AF, the City will not incur additional costs for water used between 150,000 and 201,000 AF until we exceed 201,000 AF, which will be an annual saving of approximately \$11.7 million.

4. Provide customers with water conservation programs to reduce their monthly consumption of water and wastewater.

**Benefit:** Many customers need and welcome an opportunity to reduce their water and wastewater costs.

## 'Water in Our World' Fifth Grade Education Program

"Water in Our World" is a new program developed for 5<sup>th</sup> grade students that is currently being expanded. The objective of the program is to provide valuable information to the students on water sources, treatment, conservation and protection as well as wastewater treatment, reclamation and alternative systems. What makes this material unique is its focus on Austin. It includes lessons designed to make students aware of local water issues in the hope that they will become informed citizens who will make water-wise choices now and in the future. Since the pilot in 1999, over 4,000 students and teachers have participated and the numbers continue to grow. The curriculum consists of lessons that can be taught in a three-week period, allowing plenty of hands-on experience. Each student receives a water conservation kit that includes water conserving showerheads and faucet aerators. The program is the result of a collaborative effort between the City of Austin and the Austin Independent School District.

## 'Down The Drain' Sixth Grade Education Program

"Down The Drain" is a sixth grade program developed as a collaborative effort between the City of Austin and the Austin Independent School District. The objective of the program is to provide valuable information on wastewater treatment, reclamation, and alternative waste systems. The partners want the students to come full circle in understanding the City's water and wastewater infrastructure and related issues. Like the 5<sup>th</sup> grade program, "Down The Drain" is Austin specific and can be taught as a unit or as stand-alone lessons. The pilot is scheduled for August 2002.

### ***Drinking Water Treatment***

In spite of the increasing stress on Austin's water treatment production capacity over the past year, the Utility's water treatment plants continue to produce drinking water at a quality that far exceeds the national and state regulatory requirements. At maximum production rates in mid-summer and with construction underway for improvements in

several plants, the treatment plants met the challenge of maintaining the excellent quality of our drinking water under the toughest conditions.

The coming regulatory changes for drinking water, combined with the need for increased capacity, present an additional challenge for our treatment plants over the next several years. The Utility has participated in a research project testing and evaluating ultraviolet light for disinfection. Additionally, pilot tests on the use of membranes are ongoing. The state drinking water standards for turbidity and disinfection by-product levels have been tightened, and the Utility's treatment plants continue to meet these requirements. Further challenges in meeting new regulation requirements will come in the form of monitoring for *Cryptosporidium*, and possible additional treatment needs based on those monitoring results. Planning is also underway for meeting the increased need for treated drinking water through the initiation of preliminary design and evaluation of a new Water Treatment Plant 4 site, and the evaluation of expansion possibilities at the three existing plant sites.

### ***Drinking Water Distribution System***

The City of Austin Water and Wastewater Utility serves a population of approximately 670,000 through roughly 178,000 service connections. The Utility delivers highly purified drinking water from three treatment plants to its customers through a distribution system containing more than 2,780 miles of water main, 22,160 fire hydrants, 21 pump stations, and 32 water storage reservoirs. The distribution system is further divided into eight major pressure zones because of the varied topography within the City of Austin.

Leaders in the field of drinking water supply acknowledge that water quality can degrade between the time it is treated at the plants and when it is delivered to the customers. Realizing this, the Utility is implementing a program with the goal of assuring that the high quality drinking water produced at the plant maintains its quality while it is distributed to the customers. Activities to date include developing a comprehensive monitoring plan, updating the standards for the disinfection of new pipelines being accepted into the distribution system, analyzing the suitability of sampling sites, regularly

measuring water quality in storage tanks, and routinely flushing mains when disinfection residuals are low. Water quality, as measured by the standards in the Total Coliform Rule, has improved. Several hazardous situations in the distribution system have been identified, with one already corrected and two more in the process of being corrected.

### ***Wastewater Treatment***

The City of Austin's Water and Wastewater Utility owns and operates three major wastewater treatment plants (WWTP): Govalle, Walnut Creek and South Austin Regional (SAR), which have a total treatment capacity of 120 million gallons per day (MGD). These three plants discharge their highly treated effluent to the Colorado River. The effluent quality from these plants surpasses the State and Federal permit requirements. As a result the water quality in the segment of the Colorado River to which these plants discharge is exceptionally good and the segment has been classified by the Texas Natural Resource Conservation Commission as "exceptional." The City also owns and operates four small "package" treatment plants -- Davenport Ranch, Travis County MUD #2, Balcones Wastewater Reclamation Plant and Harris Branch -- with a total capacity of approximately 1 MGD. The first three package plants dispose of their effluent by irrigating golf courses. The Harris Branch Treatment Plant discharges into Harris Branch and has experienced some performance problems during the year. A planned expansion and upgrade of the Harris Branch Plant will enable it to overcome performance problems and to handle increased flows from its service area.

Biosolids (sewage sludge) from all of the City's wastewater treatment plants are pumped to the Hornsby Bend Biosolids Management Plant for treatment and disposal. Biosolids beneficially reused were either Class A biosolids that were produced as Dillo Dirt or Class B biosolids that were land applied at Hornsby Bend. See section on Hornsby Bend below.

During 2000-2001, the Utility treated and discharged approximately 94 million gallons per day of treated effluent from Govalle, Walnut Creek and SAR WWTPs. The Association of

Metropolitan Sewerage Agencies recognizes outstanding Wastewater Treatment facilities with annual Peak Performance awards. For calendar year 2000, Govalle, Walnut Creek and South Austin Regional received Silver awards, reflecting fewer than five NPDES permit violations during the year.

Part of the treated effluent from SAR is currently used to irrigate three City-owned golf courses. Construction of an ambitious Water Reclamation Initiative Plan to provide treated effluent (reclaimed water) to the central and northeast service areas is underway at the Walnut Creek Wastewater Treatment Plant and vicinity. The South System Master Plan currently underway will expand the reclaimed water system currently served by SAR. For more details, see the *Water Reclamation Initiative* section below.

Detailed design for the expansion of Walnut Creek WWTP from 60 to 75 MGD is complete, and construction is scheduled to be completed in 2004. Detailed design for the expansion of South Austin Regional WWTP from 50 to 75 MGD is almost complete and the construction is scheduled to be completed in 2005. After the expansion of SAR, the 20 MGD Govalle WWTP will be decommissioned and all of its flows diverted to SAR for treatment.

#### The Hornsby Bend Biosolids Management Plant and the Center for Environmental Research

The City of Austin Hornsby Bend Biosolids Management Plant is an award winning biosolids reuse and recycling facility that is responsible for treating and reusing all of the City's biosolids (sewage sludge) and all yard trimmings. All water generated in processing the biosolids is treated through a 185-acre pond system and is reused to irrigate 175 acres at Hornsby Bend's onsite farm.

Following anaerobic digestion, biosolids are either land applied on the 1200-acre plant site or composted with yard trimmings picked up curbside around the city by Solid Waste Services. A by-product of anaerobic digestion is methane, which is used to produce up to 800 kilowatts of electricity from on-site generators. When land applied, the biosolids

provide all the necessary nutrients for irrigated hay crops grown on-site and harvested by a contract farmer. When composted with yard trimmings, the finished product, called “Dillo Dirt”, meets the highest treatment and safety level for biosolids products recognized by EPA and the Texas Natural Resource Conservation Commission, even considered safe for vegetable gardens. This composting program utilizes the City’s entire yard trimmings stream, 15% of the total municipal solid waste produced by the City, and accounts for approximately half of the recycling done by the City. Dillo Dirt is sold wholesale to garden centers, nurseries, and landscapers around the city.

### **Environmental Impact**

The biosolids and yard trimmings recycling program saves valuable landfill space, recycles nutrients back into the soil, helps protect water quality, and generates revenue. Over 31,000 cubic yards of Dillo Dirt were produced and sold in fiscal year 2000-1 which generated revenue and avoided the cost of landfilling. When utilized in the landscape, Dillo Dirt increases nutrient and moisture holding capacity in the soil, resulting in a healthier ecosystem. Increased organic matter in the soil from products like Dillo Dirt increases water infiltration rates and holding capacities, helping to reduce runoff and watering requirements. Reduced landfill tipping fees and revenue generated by Dillo Dirt sales make this program very cost effective.

### **Ecological Significance**

What is waste for us is the beginnings of a high nutrient food chain that provides nourishment to wildlife while recycling these “wastes” in an ecologically sound and sustainable manner. Hornsby Bend is nationally known as one of the best birdwatching sites in Texas – harboring over 350 species of birds and an abundance of other wildlife. This diversity is present both because of the bio-treatment processes used by the facility and because of the diversity of habitats found at the site. The multifaceted character of the site presents a unique opportunity for environmental research and education about Austin’s environment.

## **Research and Education**

The Center for Environmental Research(CER) is located at the Hornsby Bend Biosolids Management Plant. It is a partnership between the University of Texas at Austin, the Texas A&M System and the City of Austin. The purpose of this center is to support research and education about urban sustainability and ecology. Most directly, the CER works closely to support the recycling of biosolids at the Hornsby Bend facility and to manage the land at the 1200-acre site along 3.5 miles of the Colorado River. The CER auditorium and classrooms are used by a wide range of groups for environmental workshops, training, and classes throughout the year.

Below is a list of the main partnership programs of the CER:

- **The Hornsby Bend Community Environmental Partnership** – a stakeholder group of Austin city programs and environmental organizations involved in research and education at Hornsby Bend. – Current members include:
  - PARD Natural Resources
  - Austin Energy Green Building Program
  - Austin Water Conservation Office
  - Travis Cooperative Extension Office – TAMU
  - Travis/Austin Health and Human Services Department Work-Based Learning Program
  - The University of Texas
  - US Fish and Wildlife Service
  - Texas Parks and Wildlife
  - Travis Audubon Society
  - Texas Audubon
  - Colorado River Watch Foundation
  - TreeFolks
  - Bat Conservation International

- Capital Area Master Naturalists
  - The Native Plant Society of Texas
  - Texas Solar Energy Society
- **The Hornsby Bend Bird Observatory [HBBO]** – a project to support “citizen science” about birds in partnership with the Travis Audubon Society. Hornsby Bend is the most popular birdwatching site in the Austin Area, and the HBBO supports a range of bird monitoring programs, classes, and training for the Austin Area funded by the Travis Audubon Society. Presently, the CER hosts the HBBO, but the Utility and the Travis Audubon Society are cooperating on moving the HBBO into one of the houses on the site. Website – <http://www.hornsbybend.org>.
  - **The Ecological Mentorship Program** – an academic internship program for University of Texas undergraduates interested in natural resource management. The interns work on research projects under the supervision of UT professors and environmental professionals at the CER. This program was started through the support of an EPA Environmental Education grant awarded in the summer of 2000. Website – <http://www.esb.utexas.edu/hornsby>.
  - **The Living Lab Program** – a science education program in partnership with Hornsby-Dunlap Elementary School 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> grade (over 200 students) that brings these students to the Hornsby Bend site during the year for ecological field studies. The program is supported by volunteers and funding from Hornsby Bend Partnership organizations.

### The Austin Youth River Watch Program

The Utility and the Watershed Protection Department jointly fund the Austin Youth River Watch Program (AYRWP) managed by the Colorado River Watch Foundation (CRWF). This program provides an outreach activity for middle and high school students in Austin who are considered at risk of leaving school prior to graduation. Students who are experienced in river water quality monitoring are hired as "mentors" to work with at-risk student "trainees". Student mentors are required to conduct weekly chemical and biological monitoring with the trainees at designated monitoring sites located on one of the 22 creeks within the City of Austin that feed into the Colorado River. The students' data are used as a water quality benchmark for the testing site. After completion of their water quality monitoring duties, time is provided for students to study or to work on their school assignments. Students are paid both for their river quality water monitoring and for their involvement with schoolwork.

During 2000-2001, 88 high school and middle school students were involved in the Austin Youth River Watch program, almost double the participation last year. These students presented 13 reports at the CRWF Student Symposium and other events. 81% of the students eligible to return to the program did so, with 18 of the students promoted from trainee to mentor status. Twenty-eight students went on to participate in various summer leadership programs. On average, AYRWP high school students attended school more regularly and had grade point averages comparable to or higher than the comparison group of AISD high school students.

Additional support for the Austin Youth River Watch Program is given through the Center for Environmental Research UT undergraduate interns. During 2001, 12 interns mentored the River Watch students by volunteering once a week with the program and attending campouts and fieldtrips with the students.

### ***Water Reclamation Initiative***

The use of reclaimed water for irrigation, cooling towers, and manufacturing processes in place of potable water is an important factor in meeting the City's long term water demand. In 2000, the City began implementing the **Water Reclamation Initiative Plan** to provide reclaimed water to the central and northeast service areas. The plan identifies potential customers that could use 5.8 billion gallons of reclaimed water within these service areas. The construction of Phase 1A, the water reclamation pumping and storage facilities at the Walnut Creek Wastewater Treatment Plant and a reclaimed water transmission main to the central service area, was begun in the fall of 2000 and will be completed in the spring of 2002. These two projects in Phase 1A will serve the Morris Williams Golf Course, YMCA, First Tee Golf Course, Motorola, and other potential customers. This transmission main will also be the backbone of service to other potential customers such as the University of Texas, Capitol Complex, state facilities, Hancock Golf Course, and other potential customers in the downtown area.

In addition, the City also started the **South System Master Plan** in 2000. This plan identifies potential reclaimed water customers that could be served by the South Austin Regional Wastewater Treatment Plant. This plan identified 87 large volume customers that could potentially use 2.9 billion gallons of reclaimed water per year. These customers include Austin Energy, Austin Bergstrom International Airport, public and private golf courses, City parks, several high tech manufacturing companies, and other commercial businesses. Further implementation of these two plans will depend on the Water and Wastewater Utility priorities and availability of funding.

### ***Energy Conservation Program In Water and Wastewater Utility***

The City of Austin Water and Wastewater Utility has initiated a program to implement electric energy conservation and load reduction/management. Under this program, the Utility will implement measures to improve energy efficiency, energy conservation and electric load reduction/management through process, operational and equipment modifications.

The Utility has entered into an interdepartmental agreement with Austin Energy to reduce energy demand at various Water and Wastewater facilities and provide assistance for demand side management. The Utility has entered into "Load Co-op Program" agreements with Austin Energy for all of its Wastewater Treatment Facilities. Under these agreements, the facilities will curtail a portion of their energy loads during peak demand periods after a request from Austin Energy. The facilities will be compensated for their participation in the program based on their estimated load reduction. Facilities will also receive additional compensation depending on the actual amount of energy demand that has been reduced at the facility.

Currently, a project is being planned to reduce air requirements in the treatment process at the Walnut Creek WWTP. Air requirements at wastewater treatment plants account for almost 70% of the plants' power demand. Reduction in air requirements is expected to reduce power demand at the treatment facilities

### *Austin Clean Water Program*

The Austin Clean Water Program was created in November 2001 to comply with the U.S. Environmental Protection Agency (EPA) issued Administrative Order (A.O.) to eliminate Sanitary Sewer Overflows (SSOs) from the wastewater collection system.

The City of Austin received an A.O. from the U.S. EPA on April 29, 1999. The Administrative Order requires that the City of Austin perform a series of activities designed to result in an improved wastewater collection system free from SSO's. These activities include Infiltration/Inflow Studies, Sanitary Sewer Evaluation Surveys, as well as subsequent design and construction of necessary improvements to the wastewater collection system. Austin Clean Water Program Team provides management support and coordination for the planning, design and construction of sustainable wastewater collection facilities necessary to meet the A.O. requirements.

When sanitary sewage leaves the collection system in an uncontrolled manner, there is a potential that the sewage will enter a drainage system, creek or lake. The Utility staff makes every effort to collect and pump the material back in to the system while simultaneously trying to stop the overflow. As the Clean Water Program corrects sources of Sanitary Sewer Overflows, their frequency and volume will decrease and the amount of raw sewage that leaves the collection system and contributes to non-point source pollution will also decrease. This should result in streams that are cleaner and safer.

## **Section 5**

### **Open Space and Parkland**

#### ***Open Space***

##### Water Quality Protection Lands

In May 1998 and November 1998, voters in Austin passed water and wastewater utility revenue bond initiatives for the purchase of land to protect water quality and enhance runoff and recharge in watersheds which serve the city's water supply. Since then, the City has purchased 15,149 acres of land. This includes 6,752 acres in full fee title and 8,397 acres in conservation easements. These figures include 688 acres as conservation easements that were formerly held in full fee title by the Water and Wastewater Utility.

In 1999, the Water and Wastewater Utility initiated a land management program for Water Quality Protection Lands. Land management staff currently includes a land manager, environmental technologist, and a building and grounds lead. They are responsible for maintaining the land and implementing management plans.

On December 13, 2001, City Council approved management plans for Water Quality Protection Lands. These plans prescribe actions to be taken to manage this land in a manner that will provide optimum levels of clean high quality water as part of the City's water supply.

The management plans approved by City Council also include recommendations to accommodate public access on the land. The recommendations provide for trails and education events that will allow the public to learn about the land and how it is being managed.

The land management staff is also responsible for assisting owners of land where the City owns conservation easements. They provide monitoring and technical assistance to

assure that operation and maintenance of those lands is done in a manner consistent with the easement.

Since approval of the management plans, land management staff has begun their implementation. This last winter 900 acres of prescribed burning was conducted on three sites. Crews completed thinning another 40 acres of juniper by hand. Another 200 acres of mechanical juniper thinning is also in progress. Other projects being implemented include planting 120 trees to restore 5 acres of riparian area and restoration of 10 acres of upland to native herbaceous vegetation. All of the projects are designed to restore the hydraulic function of the City's Water Quality Protection Lands.

While the primary intent of the management plans is to preserve or enhance watershed functions, they must also address many allied natural resources issues. Water Quality Protection Lands are being managed to protect habitat for endangered species, such as the Golden Cheeked Warbler and the Barton Springs Salamander. Actions are also planned to reduce and mitigate resource damage by white tailed deer, feral hogs, and exotic wildlife. While this land is being managed to remain in a natural state, staff also faces challenges posed by potential wildland fires that may start on the land and spread to adjoining areas and fires which spread to Water Quality Protection lands from adjoining areas. The Utility has initiated partnerships with Texas Forest Service and other agencies to work to mitigate the potential for wildland fires that threaten our land or adjoining neighbors.

Now that management plans are complete, two coalitions of stakeholders have formed to develop site-specific plans for trails. One coalition is planning a trail for the Slaughter Creek management unit. The other coalition is planning a trail for the Bull Creek management unit. The National Parks Service Rivers and Trails program is facilitating both groups. These services are being provided through a partnership between the National Park Service and the Utility.

As part of the process to fulfill the responsibilities for managing these lands, the Water Quality Protection Lands staff has initiated partnerships with more than 25 organizations and local, state, and federal agencies. These include environmental organizations, activity interest groups, neighborhood groups, ethnic and cultural organizations, and federal, state, and county governments. These partnerships will provide resources to the utility to allow it to address the scientific, technical, and social aspects of managing the Water Quality Protection Lands.

### ***Parkland***

The Parks and Recreation Department oversees 15,959 acres of park and preserve lands. Of the total 15,959 acres, 5,344 acres of it are developed with recreational facilities. Austin has 24 acres of parkland per 1,000 residents. Austin ranks as a leading city in parkland acquisition both with the state and nationally.

However, it should be noted that Austin is one of the fastest growing cities in the country, and thus is losing open space at a rapid pace. The ratio of parkland per 1,000 residents was 25 acres in 1985, rose to a ratio of 30 acres in 1993, and then fell back to 24 acres by the year 2000. Thus Parks and Recreation Department's acquisition program is keeping pace with Austin's growth, but is not gaining ground.

A significant parkland acquisition program is now underway. In November 1998, Austin voters approved \$40.2 million for purchasing parkland on the east side of Austin, and greenway corridors throughout the city. The parks and greenways acquisition program is well underway, but is vying for the same land as developers and is thus moving at a slower pace. The City continues to receive neighborhood parks through the Parkland Dedication Ordinance. With these continuing efforts in place, Austin should be able to keep pace with anticipated growth in the area.

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## Section 6

### Energy Consumption and Demand

#### *Energy Conservation Programs*

The Conservation, Renewables and Environmental Policy Division, formerly Austin Energy Services, offers customers energy efficiency and energy management services. The programs provide technical advice and information, and through financial incentives, encourage customers to use energy efficiency measures and provide energy-saving products and services including free weatherization to low-income households.

The purpose of these programs is to save energy through efficiency while increasing customer satisfaction by reducing electric bills and using energy resources responsibly. When energy is used more efficiently, power plants emissions are reduced and cost decrease for Austin Energy (AE) and its customers.

Austin Energy continued to achieve significant reductions in energy use and emissions through its residential and commercial conservation programs in 2001.

#### Estimated Energy Use Reductions

45.82	megawatts in required power plant capacity
54,307	megawatt-hours energy savings
210,238	million cubic feet of natural gas

#### Estimated Annual Power Plant Emissions Reductions

Sulfur Dioxide	30.05	metric tons
Nitrogen Oxides	72.34	metric tons
Carbon Monoxide	27.27	metric tons
Carbon Dioxide	35,790	metric tons
Total Suspended Particulates	3.34	metric tons

**TABLE 6-1**

**ANNUAL PROGRAM PARTICIPATION<sup>(1)</sup>**

PROGRAMS	1982-1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b><u>RESIDENTIAL PROGRAMS<sup>(2)</sup></u></b>											
<b><u>Current Programs</u></b>											
Appliance Efficiency Program	82,099	4,362	4,635	5,874	6,111	7,425	5,814	5,638	6,151	6,303	5,736
Home Energy Loan Program	6,830	460	858	788	747	628	614	457	674	640	526
Whole House Program	3,029	679	886	1,344	1,204	1,173	1,290	1,214	1,197	1,303	1,289
Free Weatherization	2,616	521	493	630	656	826	785	665	626	760	713
Multi-Family Program <sup>(3)</sup>	10,457	11,346	6,569	4,997	3,722	6,187	2,571	3,975	3,390	4,240	4,208
Clothes Washer Rebates								179	346	353	362
Water Heater Wraps								188	35	13	1
Duct Leak Sealing/Diagnosis <sup>(4)</sup>											239
Power Partner Program										1,477	9,891
Cycle Saver Program										636	2,289
<b><u>Previous Programs</u></b>											
Multifamily A/C Service <sup>(5)</sup>	37,852										
Trees for Energy Program			162	4,997	168						
Audits	42,386										
Heater Replacements								129	116		
Whole House Winter Rebates								247	307	1	
MADAIR			960	2,013	1,375						
SUG Weatherization <sup>(6)</sup>	215	120	100	62		51	95	53	61	85	
SUG Combo Heaters & Gas Chillers <sup>(6)</sup>			119	1,003	803	1,892	3,330	2,521	2059		
<b>Total Residential Programs</b>	<b>185,484</b>	<b>17,488</b>	<b>14,782</b>	<b>21,708</b>	<b>14,837</b>	<b>18,226</b>	<b>14,457</b>	<b>15,274</b>	<b>14,986</b>	<b>16,290</b>	<b>25,255</b>
<b><u>COMMERCIAL PROGRAMS</u></b>											
<b><u>Current Programs</u></b>											
Commercial AEP Program	10,316	412	631	243	261	239	97	70	40	56	29
Commercial Rebate Program <sup>(7)</sup>										106	90
Municipal Program	13	3	3	4	15	20	36	28	2	18	18
Municipal Power Partner Program										358	130
Commercial Power Partner Program										181	411
Load Cooperative Program										4	4
District Cooling Plant <sup>(8)</sup>											3
	1982-1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b><u>Previous Programs</u></b>											

**TABLE 6-1 continued**

**ANNUAL PROGRAM PARTICIPATION<sup>(1)</sup>**

Performance Contracting Program										11		
Small Business Lighting Program <sup>(7)</sup>											54	
CEMP (All Except NCCP)	1,156	266	155	226	332	174	208	138	11			
CEMP New Construction (NCCP)	42	10	27	18	25	11	17	9	2			
Commercial Small Businesses								60	13			
Commercial Large Facilities								8	1			
Commercial Other Existing facilities									2			
Thermal Energy Storage	1	2	2	2	3	1						
SUG Audit identified kW Savings							14	0	29			
<b>Total Commercial Programs</b>	<b>11,528</b>	<b>693</b>	<b>818</b>	<b>493</b>	<b>636</b>	<b>445</b>	<b>372</b>	<b>313</b>	<b>111</b>	<b>773</b>	<b>685</b>	
<b><u>GREEN BUILDING PROGRAMS</u></b>												
<b><u>Current Programs</u></b>												
Residential Energy Star	3,544	850	750	512	523	621	526	457	681	688	396	
Residential Energy Code Enforcement								1,661	2,249	2,200	1,885	
Multi-Family Energy Code Enforcement <sup>(9)</sup>										6,245	3,863	
Commercial Green Building												
Commercial Energy Code Enforcement									1312	879		
<b>Total Green Building Programs</b>	<b>3,544</b>	<b>850</b>	<b>750</b>	<b>512</b>	<b>523</b>	<b>621</b>	<b>526</b>	<b>2,118</b>	<b>4,242</b>	<b>10,012</b>	<b>6,144</b>	
<b>TOTAL PROGRAMS</b>	<b>200,556</b>	<b>19,0311</b>	<b>6,350</b>	<b>22,713</b>	<b>15,996</b>	<b>19,292</b>	<b>15,397</b>	<b>17,697</b>	<b>19,315</b>	<b>26,596</b>	<b>32,084</b>	

**NOTES:**

- (1) Fiscal year participation of most programs is based on inspection dates.
- (2) There may be some overlap between these programs. For example, a number of MADAIR participants also went through either the Loan or Whole House program. Beginning in 1996, these participants are only counted within the Loan or Whole House Programs.
- (3) Multi-Family Program participants include high-efficiency A/C systems for new & existing construction, building envelope & ductwork improvements and lighting upgrades.
- (4) This is a new program in 2001, this program offers a discount on the duct test and rebate for having the duct sealing work done.
- (5) Multifamily A/C service Program only offers basic maintenance & cleaning coils for existing A/C system.
- (6) SUG denotes a program funded by Southern Union Gas, however from FY2000, Austin Energy no longer administrates these Programs.
- (7) In 2000 these two programs actually inherit the job of Commercial Energy Management Program (CEMP) and New Commercial Construction Program (NCCP), that were implemented in previous years. However in 2001 the Small Business Lighting Program merged into the Commercial Rebate Program.
- (8) This is another new program.
- (9) Green Builder/Multifamily Energy Code Enforcement Program includes building envelope improvements & advanced duct sealing as required by code.

**TABLE 6-2**

**ANNUAL REDUCTION IN REQUIRED POWERPLANT CAPACITY(MEGAWATTS)<sup>(1,2,5)</sup>**

<b>PROGRAMS</b>	<b>1982-1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>Cumulative</b>
<b><u>RESIDENTIAL PROGRAMS</u></b>												
<b><u>Current Programs</u></b>												
Appliance Efficiency Program <sup>(3)</sup>	66.93	4.01	4.88	4.93	5.13	5.81	5.47	4.26	5.11	5.2	4.43	116.23
Home Energy Loan Program <sup>(3)</sup>	19.66	1.28	2.38	1.76	1.67	1.58	1.92	0.96	1.55	1.378	1.11	35.24
Whole House Program <sup>(3)</sup>	8.59	2.19	2.86	3.01	2.70	2.95	3.96	2.55	3.03	2.79	2.71	37.34
Free Weatherization	4.79	0.86	0.81	1.41	1.47	1.42	0.62	0.67	0.745	0.935	0.71	14.44
Multi-Family Program	3.83	3.71	2.64	3.43	2.55	4.16	1.58	2.087	1.889	3.285	2.95	32.12
Clothes Washer Rebates								0.022	0.055	0.057	0.047	0.19
Attic Duct Leak Sealing/Diagnosis											0.178	0.178
Power Partner Program										2.55	12.265	15.68
Cycle Saver Program										0.45	1.648	2.098
<b><u>Previous Programs</u></b>												
Multifamily AC Service	16.27	0	0	0	0	0	0	0				16.27
Trees for Energy Program			0.15	0.0	0.0	0	0	0				0.15
Audits	0.15	0	0.04	0	0	0	0	0	0	0	0	0.19
MADAIR <sup>(4)</sup>			1.23	1.77	1.21	0	0					4.2
SUG Water Heater Wraps								0.008	0.0015	0.001	0.0	0.01
SUG Weatherization	0.39	0.21	0.17	0.14	0.11	0.17	0.04		0.104			1.33
SUG Combo Heaters & Gas Chillers				1.02	0.67	1.42	0.27	0.15	0.151			3.68
<b>Total Residential Programs</b>	<b>120.61</b>	<b>12.26</b>	<b>15.16</b>	<b>17.47</b>	<b>15.51</b>	<b>17.51</b>	<b>13.86</b>	<b>10.71</b>	<b>12.66</b>	<b>16.65</b>	<b>26.04</b>	<b>279.3</b>
<b><u>COMMERCIAL PROGRAMS</u></b>												
<b><u>Current Programs</u></b>												
Commercial AEP Program	12.57	0.53	0.92	0.28	0.30	0.28	0.19	0.058	0.041	0.057	0.025	15.26
Commercial Rebate Program										2.401	8.0	10.36
Municipal Program	2.62	0.7	0.83	0.32	0.5	0.70	1.12	0.33	1.771	0.33	0.34	9.56
Power Partner Program										0.66	0.869	1.595
Load Cooperative Program										4.868	2.832	7.69
District Cooling Program											1.48	1.48

**TABLE 6-2 continued**

	ANNUAL REDUCTION IN REQUIRED POWERPLANT CAPACITY(MEGAWATTS) <sup>(1,2,5)</sup>										2001 Cumulative	
	1982- 1991	1992	1993	1994	1995	1996	1997	1998	1999	2000		
<b><u>Previous Programs</u></b>												
Performance Contracting Program								1.023	0.935			1.958
Small Business Lighting Program										0.171		0.171
CEMP (All Except NCCP)	25.53	3.29	3.45	11.33	15.89	7.57	9.16	8.43	1.039			85.69
CEMP New Construction (NCCP)	6.10	1.08	1.59	2.65	7.52	8.77	5.94	1.33	0.237			35.22
Commercial Small Business									0.015			0.015
Commercial Large Facility									0.9			0.9
Commercial Other Existing Facility									0.122			0.122
Thermal Energy Storage	0.46	0.23	0.18	0.41	0.0	0	0	0	0.0			1.28
Southern Union Gas Audits							0.87	0.23	0.032			1.13
<b>Total Commercial Programs</b>	<b>47.28</b>	<b>5.83</b>	<b>6.97</b>	<b>14.99</b>	<b>24.21</b>	<b>17.32</b>	<b>17.28</b>	<b>11.40</b>	<b>5.09</b>	<b>8.56</b>	<b>13.55</b>	<b>172.4</b>
<b><u>GREEN BUILDING PROGRAMS</u></b>												
<b><u>Current Programs</u></b>												
Residential Energy Star	2.73	1.05	0.92	1.15	0.32	0.38	0.97	0.612	1.104	1.118	0.33	10.54
Residential Energy Code Enforcement								2.966	2.714	2.680	2.33	10.68
Multifamily Energy Code Enforcement										2.92	1.815	4.7
Commercial Green Building										0.873	0.79	1.66
Commercial Energy Code Enforcement									0.385	0.722	0.95	2.057
<b>Total Green Building Programs</b>	<b>2.73</b>	<b>1.05</b>	<b>0.92</b>	<b>1.15</b>	<b>0.32</b>	<b>0.38</b>	<b>0.97</b>	<b>3.58</b>	<b>4.20</b>	<b>8.31</b>	<b>6.23</b>	<b>29.8</b>
<b>TOTAL PROGRAMS</b>	<b>170.62</b>	<b>19.14</b>	<b>23.05</b>	<b>33.61</b>	<b>40.04</b>	<b>35.21</b>	<b>32.11</b>	<b>25.681</b>	<b>21.96</b>	<b>33,46</b>	<b>45.82</b>	<b>481.1</b>

**NOTES:**

- (1) In 2001 the avoided utility capacity Reserve Margin of 15%, and Transmission & Distribution Losses of 7% are included.
- (2) In 2001 Residential Demand Savings were estimated through DOE simulations. Commercial Demand Savings were estimated using engineering calculations based on the measures installed.
- (3) In 1995~1999 both demand reductions (kW) and energy savings(kWh) were calculated using multipliers developed by John Trowbridge. Beginning in 1996, MADAIR (duct sealing) kW per participant are included as part of Loan & Whole House Program numbers.
- (4) See picture 1.



**TABLE 6-3 continued**

**ANNUAL ENERGY SAVING (MEGAWATT-HOURS SAVED)<sup>(1,2,3,4)</sup>**

<b>PROGRAMS</b>	<b>Avg. Annual 1982- 1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998<sup>(5)</sup></b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
<b><u>Previous Program</u></b>											
Performance Contract Program								184	3,073.8	0	0
Small Business Lighting Program										296.7	0
CEMP (All Except NCCP)	7,528	9,583	10,057	32,895	51,165	25,234	18,658	16,763	964	0	0
CEMP New Construction (NCCP)	1,525	2,710	3,963	6,587	21,172	13,829	5,547	875	438.84	0	0
Commercial Small Businesses									9.9	0	0
Commercial Large Facilities									620.1	0	0
Commercial Other Existing Facilities									859.1	0	0
SUG Audit Identified kW savings									30.1	0	0
<b>Total Commercial Programs</b>	<b>12,789</b>	<b>16,863</b>	<b>19,969</b>	<b>42,072</b>	<b>74,400</b>	<b>42,910</b>	<b>26,258</b>	<b>19,604</b>	<b>8,461.6</b>	<b>6,907.6</b>	<b>27,555</b>
<b><u>GREEN BUILDING PROGRAMS</u></b>											
<b><u>Current Programs</u></b>											
Residential Energy Star	438	1,682	1,484	1,832	498	976	965	548	772	788	600
Residential Energy Code Enforcement								2936	2,336	2,307	2,837
Multi-family Energy Code Enforcement										4,720	4,781
Commercial Green Building										3,252.5	2,208
Commercial Energy Code Enforcement									820	1,448.5	1,889
<b>Total Green Building Programs</b>	<b>438</b>	<b>1,682</b>	<b>1,484</b>	<b>1,832</b>	<b>498</b>	<b>976</b>	<b>965</b>	<b>3,484</b>	<b>3,928</b>	<b>12,516</b>	<b>12,336.5</b>
<b>TOTAL PROGRAMS</b>	<b>26,186</b>	<b>34,225</b>	<b>38,476</b>	<b>61,876</b>	<b>89,583</b>	<b>60,228</b>	<b>41,412</b>	<b>32,239</b>	<b>22,631</b>	<b>40,191</b>	<b>54,307</b>

**NOTES:**

- (1) These figures represent the amount of energy saved each year from measures implemented that year only.
- (2) These figures include a 7% Transmission & Distribution line loss factor.
- (3) For 1982-1994 no energy savings estimates were calculated using multipliers developed by Glenn Haynes 8/11/91.
- (4) In 2001 Residential Demand Savings were estimated through DOE simulations. Commercial Demand Savings were estimated using engineering calculations based on the measures installed.
- (5) The reduction in electric energy consumption with the Power Partner Program and Load Cooperative Program is not as significant as their demand reduction. In 2001 load-control was implemented only for 12 hours in July.
- (6) The reduction in electric energy consumption with the installation of a gas powered combo heater is significant due to fuel switching. However, prior to 1997 energy savings for gas combo heaters were not counted due to the fact that the old methodology used to calculate demand reduction for this program found none. Thus, we did not feel it appropriate to assign energy savings when no demand goal was met.
- (7) Cooling Thermal Storage shifts operation of chillers from utility system's peak load hours to the night. Energy saving from District Cooling Plant only results from higher efficiency of chiller system, however part of this saving was eroded by operation of Cooling Thermal Storage. Thus the energy saving of this program is not marked



**TABLE 6-4 continued**  
ANNUAL CUMULATIVE ENERGY SAVING

<b>PROGRAMS</b>	<b>Cumulative 1982-<sup>(4)</sup> 1991</b>	<b>1992<sup>(5)</sup></b>	<b>1993<sup>(5)</sup></b>	<b>1994<sup>(5)</sup></b>	<b>1995<sup>(5)</sup></b>	<b>1996<sup>(5)</sup></b>	<b>1997<sup>(5)</sup></b>	<b>1998<sup>(5)</sup></b>	<b>1999<sup>(5)</sup></b>	<b>2000<sup>(5)</sup></b>	<b>2001<sup>(5)</sup></b>
<b><u>Previous Programs</u></b>											
Performance Contracting Program								184	3,258	3,258	3,258
Small Business Lighting Program										296.7	296.7
CEMP (All Except NCCP)	270,812	84,862	94,918	127,813	178,981	204,215	222,873	239,636	240,600	240,600	240,600
CEMP New Construction (NCCP)	20,975	17,960	21,923	28,510	49,687	63,516	69,063	69,938	70,377	70,377	70,377
Other Commercial Programs									2,339	2,339	2,339
<b>Total Commercial Programs</b>	<b>491,893</b>	<b>144,755</b>	<b>164,723</b>	<b>206,795</b>	<b>281,204</b>	<b>324,113</b>	<b>350,371</b>	<b>369,975</b>	<b>379,256</b>	<b>382,765</b>	<b>410,185</b>
<b><u>GREEN BUILDING PROGRAMS</u></b>											
<b><u>Current Programs</u></b>											
Residential Energy Star	16,163	6,063	7,547	9,379	9,877	10,853	11,818	12,366	13,138	13,926	14,524
Residential Energy Code Enforcement								2,936	5,272	7,579	10,403
Multifamily Energy Code Enforcement										4,720	9,501
Commercial Green Building Program										3,252.5	5,450.3
Commercial Energy Code Enforcement										2,268.5	4,148.4
<b>Total Green Building Programs</b>	<b>16,163</b>	<b>6,063</b>	<b>7,547</b>	<b>9,379</b>	<b>9,877</b>	<b>10,853</b>	<b>11,818</b>	<b>15,302</b>	<b>18,410</b>	<b>31,746</b>	<b>44,026</b>
<b>TOTAL PROGRAMS</b>	<b>1,134,665</b>	<b>282,501</b>	<b>318,812</b>	<b>380,688</b>	<b>470,280</b>	<b>530,507</b>	<b>571,919</b>	<b>610,447</b>	<b>636,287</b>	<b>670,134</b>	<b>724,529</b>

**Notes:**

- (1) With the exception of Multifamily AC Service, these calculations assure 100% persistence of impacts for all measures installed since 1982. Annual total figures represent total savings occurring during that one year only from all measures implemented since program inception.
- (2) These figures include a 7% Transmission & Distribution line loss factor.
- (3) 1992-1994 energy savings estimates were calculated using MW/MWh multipliers developed by Glenn Haynes, 8/11/91.
- (4) Cumulative MWh savings for 1982-1991 represent all energy saved over this nine year period since their inception.
- (5) Annual total figures represent total savings occurring during that one year only from all measures implemented since program inception.
- (6) Multifamily AC service savings were assumed to decline 50% per year to no impact after 2 years (this persistence was attributed to similar program in Central Power & Lights 1991 Energy Efficiency Plan filed with the PUC) .

TABLE 6-5

FY2001 PERCENTAGE PARTICIPATION KILOWATT AND MEGAWATT-HOURS GOAL ACHIEVED<sup>(1)</sup>

	Participants			kW			MWh		
	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal
A.E.P. Program (Existing)	3,400	3,813	112.3	3,130	3,317.31	106	3,400	3,813	
A.E.P. Program (New)	2,500	1,923	78.6	1,440	1,115.34	77	1,000	769	
Home Energy Loan Program	675	526	103.2	1,360	1,104.60	81	1,110	1,015	
Whole House Program	1,250	1,289	106.1	2,630	2,706.9	103	2,880	2,964.7	
Free Weatherization	670	713	157	670	713	126.7	1,010	1,076	
Multi-Family Program	2,700	4,208	144.8	2,410	2,948.4	122	2,160	3,995	
Clothes Washer Rebates	250	362	93	40	47.06	118	100	173.8	
Duct Leak Sealing/Diagnosis	250	240	95.6	190	177.6	93		288	
Power Partner Program	10,000	9891	98.9	10,000	12,264	122		118.7	
Cycle Saver Program	3,000	2289	6.3	1,700	1,648	97		201.7	
<b>Total Residential Program</b>	<b>24695</b>	<b>25,254</b>	<b>102.3</b>	<b>23,570</b>	<b>26,043</b>	<b>110</b>	<b>16,000</b>	<b>14,416</b>	

COMMERCIAL PROGRAMS	Participants			kW			MWh		
	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal
Commercial A.E.P. Programs									
Existing Equipment	150	11	7.3	130	11.8			10.24	
New Construction	50	18	36	29	13.3			11.17	
Commercial Rebate Program		90		6,000	8,017	133.6		26,656.1	
Municipal Program		18		500	341.2	68.2		828	
Municipal Power Partner		541		200	216.0	108		1.9	
Commercial Power Partner				300	637.1	212.4		5.6	
Load Cooperative Program		4	100	10,000	2,840.8	28.4		7.4	
District Cooling Plant	8	3			1,484			34.03	
<b>Total Commercial Program</b>		<b>685</b>			<b>13,565</b>			<b>27,555</b>	

TABLE 6-5 continued

FY2001 PERCENTAGE PARTICIPATION KILOWATT AND MEGAWATT-HOURS GOAL ACHIEVED<sup>(1)</sup>

GREEN BUILDING PROGRAMS	Participants			kW			MWh		
	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal	Forecast	Actual	% of Goal
Residential G.B./Energy Star	700	396	57	490	343.7	70	987	600	61
Residential Energy Code	2,200	1,885	86	2,200	2,330	106	3080	2,837	92
Multi-Family Energy Code	6,000	3,863	64	2,280	1,815	80	6941	4,804	69
Commercial Green Building				800	790.7	99	3039	2,207.5	72.6
Commercial G.B. Energy Code				590	951	162	1353	1,888.2	139.6
<b>Total Green Building Program</b>		<b>6,144</b>		<b>6,360</b>	<b>6,230</b>	<b>96</b>	<b>15,400</b>	<b>12,336.5</b>	<b>80</b>

	Participants		KW		MWh	
<b>Total Program</b>		<b>32,084</b>		<b>45,82</b>	<b>206.4</b>	<b>54,307</b>

**NOTES:**

(1) For evaluation of percentage of reached goal, the demand reduction is based on value with Marginal Reserve and T & D losses, the energy savings is based on value with T & D losses as well.

**TABLE 6-6**

**ANNUAL GAS SAVINGS (CCF\*)<sup>(1)</sup>**

<b>PROGRAMS</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
<b><u>RESIDENTIAL PROGRAMS</u></b>							
Appliance Efficiency Program	209,346	65,702	51,454	43,680	58,042	59,500	47,594
Home Energy Loan Program	127,420	61,830	43,152	85,785	41,412	39,123	36,820
Whole House Program	186,850	118,143	72,356	129,829	71,810	85,763	54,424
Free Weatherization	96,159	77,989	36,785	93,665	73,868	68,322	71,400
Multi-Family Program <sup>(2)</sup>							0
Clothes Washer Rebates					2,176	0	0
Water Heater Wraps				4,700	1,084.4	0	0
Duct Leak Sealing/Diagnosis <sup>(3)</sup>							0
Cycle Saver & Power Partner Program <sup>(4)</sup>							0
Heater Replacements				7,277	6,543	0	0
Whole House Winter Rebates				38,532	47,892	0	0
SUG Weatherization	0	15,865	2,484		10,030	0	0
SUG Combo Heaters & Gas Chillers	0	13,244	23,310	63,025	51,475	0	0
<b>Total Residential Programs</b>	<b>624,157</b>	<b>352,773</b>	<b>237,757</b>	<b>475,450</b>	<b>364,332</b>	<b>262,555</b>	<b>210,238</b>
<b><u>COMMERCIAL PROGRAMS</u></b>							
Commercial A.E.P. Program <sup>(2)</sup>	0	2,142	0	0	489	497.3	0
Commercial Rebate Program					0		0
Municipal Program <sup>(2)</sup>	0	0			0	0	0
Power Partner Program <sup>(2)</sup>				0	0	0	0
CEMP (All Except NCCP)	3,857	0	0	0	0	0	0
CEMP New Construction (NCCP)	0	0	0	0	0	0	0
Other Commercial Services				1330.7	0	0	0
<b>Total Commercial Programs</b>	<b>3,857,142</b>	<b>0</b>	<b>0</b>	<b>1,819</b>	<b>497.3</b>	<b>0</b>	

**TABLE 6-6 continued**  
ANNUAL GAS SAVINGS (CCF\*)<sup>(1)</sup>

**GREEN BUILDING PROGRAMS**

<b>Residential Green Building<sup>(2)</sup></b>	<b>4,382</b>	<b>0</b>	<b>8,216</b>	<b>8,957</b>		<b>9,847</b>	<b>0</b>
<b>Total Green Building Programs</b>	<b>4,382</b>	<b>0</b>	<b>8,216</b>	<b>8,957</b>		<b>9,847</b>	<b>0</b>
<b>TOTAL PROGRAMS</b>	<b>628,014</b>	<b>354,915</b>	<b>237,757</b>	<b>475,450</b>	<b>366,151</b>	<b>263,052</b>	<b>210,238</b>

**NOTES:**

\* Gas savings in CCF. One CCF is equivalent to 100 Cubic Feet.

(1) In 2001 residential gas savings were estimated through DOE2 simulations. Commercial gas savings were estimated using engineering calculations.

(2) Gas savings were assumed small.

(3) The gas would be saved with this measure, since there was no proper methodology, the saving wasn't estimated.

**TABLE 6-7**

**2001 EMISSIONS REDUCTIONS (Metric Ton)<sup>(1)</sup>**

<b><u>RESIDENTIAL PROGRAMS</u></b>	<b><u>Pollutants</u></b>				
	<b>Sulfur Dioxide</b>	<b>Nitrogen Oxides</b>	<b>Suspended Particulates</b>	<b>Carbon Monoxide</b>	<b>Carbon Dioxide</b>
<b>Residential A.E.P.</b>	<b>2.660</b>	<b>6.404</b>	<b>0.296</b>	<b>2.414</b>	<b>3,168.3</b>
<b>Clothes Washer Rebate (Electric)</b>	<b>0.101</b>	<b>0.243</b>	<b>0.011</b>	<b>0.092</b>	<b>120.1</b>
<b>Whole House Program</b>	<b>1.721</b>	<b>4.143</b>	<b>0.191</b>	<b>1.562</b>	<b>2,049.8</b>
<b>Home Energy Loan</b>	<b>0.589</b>	<b>1.418</b>	<b>0.065</b>	<b>0.535</b>	<b>701.7</b>
<b>Free Weatherization</b>	<b>0.625</b>	<b>1.504</b>	<b>0.069</b>	<b>0.567</b>	<b>744.2</b>
<b>Multi-Family</b>	<b>2.319</b>	<b>5.583</b>	<b>0.258</b>	<b>2.104</b>	<b>2,762.2</b>
<b>Attic Duct Leak Sealing/Diagnosis</b>	<b>0.167</b>	<b>0.403</b>	<b>0.019</b>	<b>0.152</b>	<b>199.4</b>
<b>Water Heater Wraps</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.1</b>
<b>Power Partner Program</b>	<b>0.069</b>	<b>0.166</b>	<b>0.008</b>	<b>0.063</b>	<b>82.1</b>
<b>Cycle Saver Program</b>	<b>0.117</b>	<b>0.280</b>	<b>0.013</b>	<b>0.105</b>	<b>139.4</b>
<b>Total Residential</b>	<b>8.368</b>	<b>20.146</b>	<b>0.930</b>	<b>7.594</b>	<b>9,967.4</b>
<b><u>COMMERCIAL PROGRAMS</u></b>					
<b>Commercial A.E.P.Program</b>	<b>0.012</b>	<b>0.028</b>	<b>0.001</b>	<b>0.011</b>	<b>13.8</b>
<b>Commercial Rebate Program</b>	<b>14.394</b>	<b>34.653</b>	<b>1.599</b>	<b>13.061</b>	<b>17.145</b>
<b>Municipal Projects Completed</b>	<b>0.586</b>	<b>1.411</b>	<b>0.065</b>	<b>0.532</b>	<b>697.9</b>
<b>Load Management</b>	<b>0.008</b>	<b>0.019</b>	<b>0.001</b>	<b>0.007</b>	<b>9.583</b>
<b>District cooling plant</b>	<b>0.018</b>	<b>0.044</b>	<b>0.002</b>	<b>0.017</b>	<b>22.016</b>
<b>Total Commercial</b>	<b>15.018</b>	<b>36.155</b>	<b>1.669</b>	<b>13.628</b>	<b>17,887.9</b>
<b><u>GREEN BUILDING PROGRAMS</u></b>					
<b>Residential Energy Star</b>	<b>0.324</b>	<b>0.780</b>	<b>0.036</b>	<b>0.294</b>	<b>385.9</b>
<b>Residential Energy Code Enforcement</b>	<b>1.532</b>	<b>3.688</b>	<b>0.170</b>	<b>1.390</b>	<b>1,824.7</b>
<b>Multi-family Energy Code Enforcement</b>	<b>2.594</b>	<b>6.245</b>	<b>0.288</b>	<b>2.354</b>	<b>3,089.8</b>
<b>Commercial Green Building</b>	<b>1.192</b>	<b>2.870</b>	<b>0.132</b>	<b>1.082</b>	<b>1,419.8</b>
<b>Commercial Energy Code Enforcement</b>	<b>1.020</b>	<b>2.455</b>	<b>0.113</b>	<b>0.925</b>	<b>1,214.4</b>
<b>Total Green Building</b>	<b>6.662</b>	<b>16.038</b>	<b>0.740</b>	<b>6.045</b>	<b>7,934.7</b>
<b>TOTAL PROGRAM</b>	<b>30.05</b>	<b>72.34</b>	<b>3.34</b>	<b>27.27</b>	<b>35,790.0</b>

**TABLE 6-7 continued**

**2001 EMISSIONS REDUCTIONS (Metric Ton)<sup>(1)</sup>**

**NOTES:**

(1) Before 1995, emission reduction were estimated with emission factors, the emission factor depends on the percentage of energy produced by different units. Therefore the emission reduction is a product of energy savings and emission factors.

In fact the energy reduction from each unit is not in the same proportion to total reduction due to DSM programs. Actually the most energy reduction is from gas-fired unit. From FY 1996 we have followed another approach, the emission reduction was estimated with marginal emission factor. Since emission factor of sulfur dioxide from a coal-fired unit is thousand times higher than one from a gas-fired unit, the marginal emission factor depends on what kind of unit we reduced energy. As a result the total emission reduction of each pollutant depends not only the amount of energy reduction, but also on what kind of unit we reduced energy.

The emission factor and marginal emission factor are listed in following

		SO2	NOx	TSP	CO	CO2
Emission Factor (grams/kWh)*		1.38	1.18	0.112	0.21	560
Marginal Emission Factor (grams/kWh)**	FY2000	0.161	1.096	0.031	0.76	617
	FY2001	0.54	1.3	0.06	0.49	643

\*Coal-fired units produced about 40% electricity.

\*\*In FY2000, as a result of DSM programs, more than 95.3% of energy reduction is from gas-fired units, instead in FY2001 it decreased to 84.4%, that means less energy production was cut from gas-fired units due to conservation programs, consequently it cuts more energy from coal-fired units. As a result, it changes the marginal emission factor and leads to significantly reduction of sulfur dioxide emission.

## ***Green Building***

The Austin Energy Green Building Program continues to be a national leader in the area of sustainable commercial and residential building. The program was the first program in the country to offer a sustainability rating. It is a measure of a building's environmental impact in terms of energy, water and resource efficiency. The Program was one of the twelve winners—the only one in the United States—of a United Nations Award for environmental initiatives at the 1992 Earth Summit in Rio de Janeiro.

In 2001 the work of the Green Building Program resulted in the conservation of 12,044 megawatt hours of electricity. This translates into a reduction of 10,238 tons of Carbon Dioxide, 39 tons of Sulfur Dioxide and 17 tons of Nitrous Oxides in the release of these pollutants. See the following chart for more results of the Green Building Program's energy conservation and peak load reduction.

In the past, homes and other buildings have been built without considering how they affect the global, local and indoor environments. In addition, how specific systems related to each other, such as how heating and cooling needs relate to window size, were rarely considered. The Green Building Program bases its rating system on the premise that a building is a single system and considers these major components in the rating: energy, water, materials, health and safety and community.

Once thought to be a fringe movement, Green Building has become main stream. The Green Building program counts 50 architectural firms, 46 builders, and 54 building product/service suppliers among its core membership. Three larger, production builder members are building all their homes to Green Building standards.

People from all walks of life are served by the Green Building Program; however, special attention is paid to low-income citizens. With the philosophy that everyone deserves safe, efficient and environmentally sound housing, the program has direct influence on how city-funded affordable housing is built. All city-subsidized homes must now meet at least a basic



Green Building rating and Green Building has become a major component of the City's S.M.A.R.T. Housing program.

Economic activity ranging from sales of green products to green building services such as architectural and system design have been generated in the private sector as a result of the program.

### ***Cogeneration***

Austin Energy is working with local commercial and industrial customers to identify and develop cogeneration opportunities. Cogeneration (also known as combined heat and power) is a process that captures waste heat that is generated in the process of making electricity. Heat captured by cogeneration units located at customer sites can be used for domestic hot water and can augment boilers. This process results in higher energy efficiencies and lower harmful air emissions.

Austin Energy has begun a 200kW fuel cell demonstration project at RBJ Health Center scheduled to be on line in June 2002. This project will measure two things: 1) the emissions reductions to be gained through fuel cell technology and 2) the benefits of cogeneration using fuel cells utilizing combined heat and power.

Austin Energy has purchased the Central Utility Plant (a chill water plant) at the Domain in north Austin and has begun engineering design for a cogeneration unit to be added to the site.

### ***Power Plant Emissions Controls***

Austin Energy power plants, including the Fayette Power Project, are in compliance with all existing air regulations. The Texas Natural Resource Conservation Commission (TNRCC) has developed a NO<sub>x</sub> allowance program as part of the Deregulation Bill (SB-7) which is intended to reduce NO<sub>x</sub> emissions in Texas by 50% from power plants that have been grandfathered from obtaining air permits. Austin Energy has submitted permit applications for all of our grandfathered units, which include all the Holly Units and Decker Unit #1. We

have also opted to include Decker Unit #2 in the program in order to reduce our compliance costs.

Austin Energy has developed a comprehensive NOx reduction strategy that will ensure compliance with the new air emissions regulations that were part of the deregulation of the electric utility industry in Texas. In addition, Austin Energy has committed to reduce NOx emissions beyond these requirements to offset the new emissions of NOx from the Sand Hill Energy Center (SHEC). Additional NOx reductions at both the Holly and Decker Power Plants will be made to create the offsets. Actual projects to reduce NOx from the Holly and Decker Power Plants will begin in 2002.

TNRCC is also in the process of developing regional NOx control regulations (117 Rule) for power plants that are currently permitted. These regulations will result in an approximate 50% reduction in the emission of NOx from the affected units, which include Decker Unit #2 and the Fayette Power Project Units #1 and #2. Decker Unit #2 emissions are already at low levels and will not be impacted by the proposed 117 Rule. The Fayette Power Project will have to have lower NOx emissions in order to comply with the 117 Rule. Austin Energy and the Lower Colorado River Authority have agreed to retrofit the two Fayette Units with lower emitting burners to bring the units in compliance with the proposed requirements.

AE's new simple cycle units at SHEC started operating in 2001 adding 180 MW of capacity. They include state-of-the-art NOx controls called Selective Catalytic Reduction (SCR) which reduce the NOx emission concentrations to below 5 ppm. This is far below the current standard of 25 ppm to which the units could have been built. AE is currently adding a new combined cycle unit at SHEC, which will enable AE to meet Austin's energy needs by providing an additional 321 MW of capacity by the end of 2003. These units will also have SCRs and meet current emissions standards.

The City of Austin currently meets all the requirements to be declared an ozone non-attainment city. The City of Austin has worked with the surrounding counties to develop the O<sub>3</sub> Flex Plan. Austin Energy is participating in the O<sub>3</sub> Flex Plan and has committed to reductions of ozone forming pollutants from its power plants and mobile sources.