

# **UNIVERSITY OF WASHINGTON MEDICAL CENTER UTILITY COST REDUCTION**

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## **Presenters**

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# UW MEDICINE, SEATTLE WA



**University of Washington Medical Center Campus**

UW Medicine

# ABOUT UW MEDICINE

UW Medicine owns or operates

- 4 Medical Centers
  1. **University of Washington Medical Center**
  2. Harborview Medical Center
  3. Northwest Hospital & Medical Center
  4. Valley Medical Center
- A network of nine UW Neighborhood Clinics that provide primary care and secondary care
- The physician practice UW Physicians
- The UW School of Medicine
- Airlift Northwest.

In addition, UW Medicine shares in the ownership and governance of Children's University Medical Group and Seattle Cancer Care Alliance, a partnership among UW Medicine, Fred Hutchinson Cancer Research Center and Seattle Children's.

# UWMC SUSTAINABILITY

- The University Washington Medical Center is a leader in environmental stewardship and sustainability. It has been engaged in the sustainability practice activities since 1987, and continues its sustainability effort as part of its 2002 Quality Improvement initiative when it joined Hospitals for a Healthy Environment (H2E).
- In 2008, UW Medical Center became a Charter Member of Practice Greenhealth (PGH). For the last ninth consecutive year, the University Washington Medical Center has been honored with the top award for environmental stewardship from Practice Greenhealth, the nation's premier organization fostering ecologically responsible practices in healthcare.  
<https://practicegreenhealth.org/about/press/press-releases/practice-greenhealth-celebrates-first-ever-winners-top-25-environmental-e>
- UW Medical Center has also been a role model for the UW Medicine Health System and has facilitated in getting other hospitals involved in the sustainability activity. All four of the UW Medicine hospitals are members of Practice Greenhealth.

# UWMC ENVIRONMENT OF SUSTAINABILITY

## INPUTS

Systems

Processes

Policies

Sustainability  
Management Guidance

Best Practices in  
Consulting

## ACTIVITIES

1. Recognize the opportunity
2. Assess the opportunity
3. Manage the sustainability project
4. Plan for additional project
5. Protect people and the environment
6. Repeat

## OUTCOMES

Healthy People

Safe Community

Healthy Environment

Sustainable Practices

Compliance with  
Regulations

Financially Stable

Increased Use of Best  
Practices

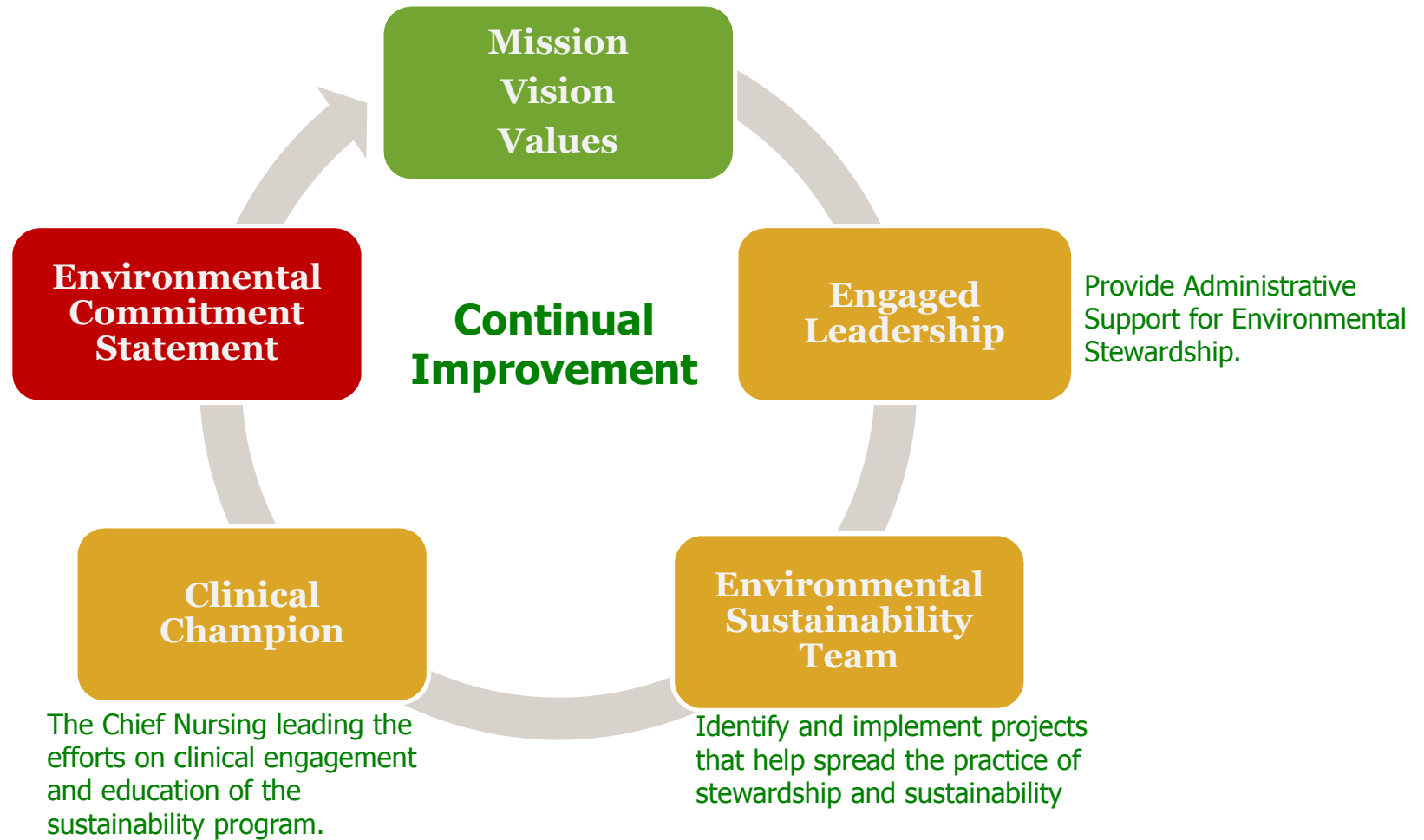
*And most importantly..*

**Achievement of our  
teaching research and  
patient care mission!**

## How do we create an Environment of Sustainability ?

Culture, Awareness, Resources and Engagement combine to keep us safe, healthy and compliant.

# UWMC SUSTAINABILITY MODEL



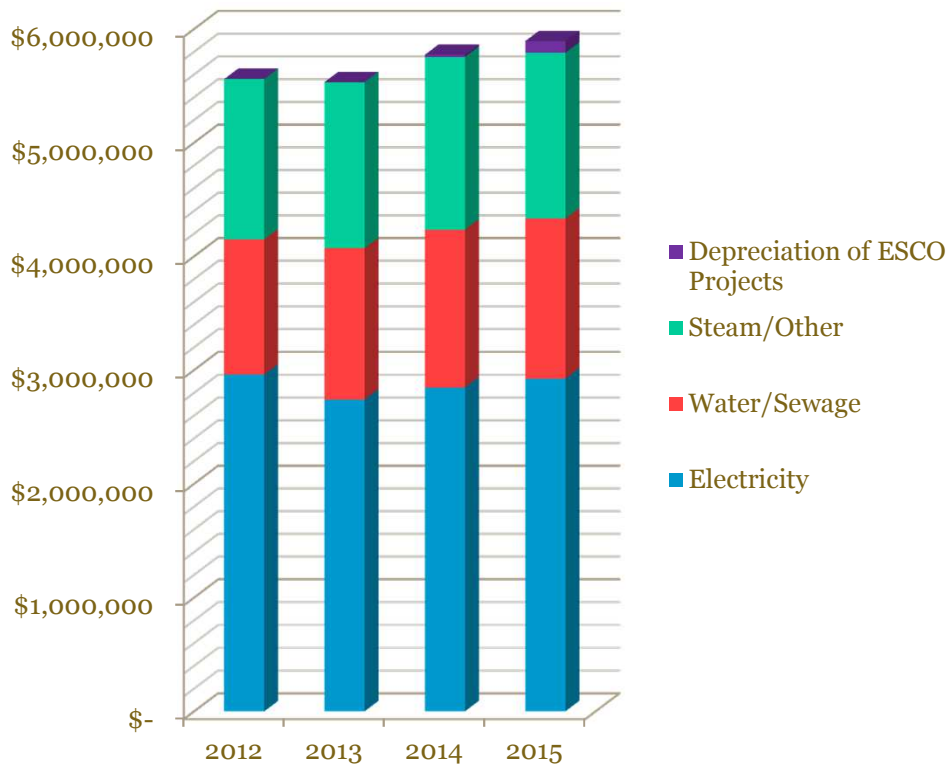
# UWMC OPERATIONAL STATISTICS

| Fiscal Year                                                 | 2012         | 2013         | 2014         | 2015         |
|-------------------------------------------------------------|--------------|--------------|--------------|--------------|
| Operating Beds                                              | 408          | 417          | 423          | 428          |
| CMI Weighted<br>Adjusted Patient<br>Days                    | 421,426      | 434,263      | 457,096      | 495,479      |
| CMI Weighted<br>Adjusted Discharges                         | 64,082       | 64,565       | 67,467       | 72,441       |
| CMI Weighted<br>Adjusted Occupied<br>Beds                   | 1,155        | 1,190        | 1,252        | 1,357        |
| Square Feet<br>Maintained                                   | 1,493,650    | 1,613,929    | 1,613,929    | 1,615,291    |
| Total Utility Cost<br>Including Incremental<br>Depreciation | \$ 5,559,569 | \$ 5,532,861 | \$ 5,773,273 | \$ 5,893,680 |
| Utility Cost per CMI<br>Weighted Adjusted<br>Discharges     | \$ 86.76     | \$ 85.69     | \$ 85.57     | \$ 81.36     |
| Utility Cost per CMI<br>Weighted Occupied<br>Beds           | \$ 4,813     | \$ 4,649     | \$ 4,611     | \$ 4,343     |
| Utility Cost per<br>Square Feet<br>Maintained               | \$ 3.72      | \$ 3.43      | \$ 3.58      | \$ 3.65      |

# UWMC YEAR OVER YEAR EXPENSE

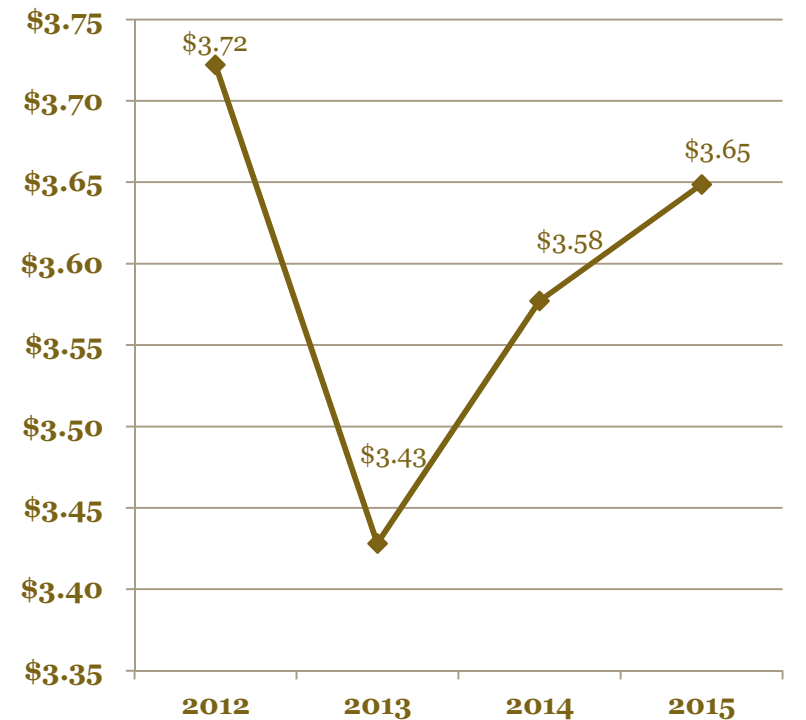
4.3 % 2014 vs. 2.1% 2015  
increase in utility expense

## UWMC Utility Expense



Gross Square Feet Maintained  
increased by 8% from 2012 to  
2013 with the opening of the  
Montlake Tower.

## Utility Cost per Square Feet Maintained





# UWMC FAN SYSTEM UPGRADES

UWMC upgraded four aging fan systems with new fan array–type systems, which resulted in improved energy efficiency and reliability.

UWMC’s previous fan systems in these locations comprised a single large motor turning a single fan installed within each system’s ductwork; these systems required a high level of horsepower. The new fan array system uses more but smaller fans to produce the same level of airflow with less total horsepower, resulting in reductions in the amount of energy required to run the system: 24% less to run the energy storage device, 49%-53% less for the air handling units, and 67% less for the air handling unit exhaust fan.

The new systems are capable of variable speeds to ensure that the correct amount of energy is used.

The fans were sized for N+1 to create redundancy, reducing the risk of system failure. The smaller fans are also easier and less expensive to maintain and replace, with a fan replacement taking less than 2 hours.

The fan replacement projects also included:

- Replacement of failing heating, cooling, and heat recovery coils
- Filtration upgrades to meet current code
- Upsizing of new fan walls to accommodate future system upgrades

# OLD NN SUPPLY FAN



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# New Fan Replacement Spool



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# NEW NN Fan Wall



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# DIRECT DIGITAL CONTROL OPTIMIZATION

A control optimization project involved retro commissioning controls

- Including turning down fans after hours
- Adjusting discharge air temperatures and static pressure settings.

These changes resulted in annual savings of 325,219 kWh of electricity and 30,371 therms of gas.

# WATER EFFICIENCY UPGRADE

- Flush valve commissioning for toilets and urinals was done, including replacement of diaphragm kits and flush valve inner caps to ensure that the proper flush curve is achieved for each fixture, and calibration and tuning of each flush valve to increase the fixture's performance and save water.
- Vandal-proof flow-control devices with the appropriate flow rate and pattern were installed in all sinks.
- All shower heads were replaced with suitable lower-flow devices.
- These water efficiency upgrades resulted in savings of 6,600 hundred cubic feet, or 4.9 million gallons, of water and 10,000 therms associated with water heating per year.

# DOMESTIC HOT WATER AND CHILLER UPGRADES

- Five older shell-in-tube hot water tanks were replaced with three hot water generators. These new “instant hot” water heaters are more efficient as they heat the water as it passes through rather than heating and maintaining the temperature of a large tank of water.
- New modular heat recovery chillers were installed to replace older, less-efficient chillers. The new chillers were designed to use the waste heat (in the form of condenser water) to both preheat the incoming domestic cold water to the new hot water generators and to reheat the water. This reduces the amount of natural gas needed to heat the water.
- These hot water and chiller upgrades replaced infrastructure at the end of its useful life, increased summer cooling capacity, provided increased system redundancy, and is expected to result in savings of approximately \$106,000 per year.

# Energy Efficiency Project Data in the past two years (2013-2014)

| Project Description      | Project Category | Energy Saved/Year | Units  | Kbtus Saved | Dollar Savings |
|--------------------------|------------------|-------------------|--------|-------------|----------------|
| Controls Optimization    | Cooling          | 150,998           | kwh    | 515,356     | \$11,739       |
| Controls Optimization    | Heating          | 14,657            | Therms | 1,465,700   | \$14,510       |
| Lake Water Optimization  | Cooling          | 2,442             | CCF    | 251,526     | \$5,552        |
| Pac fan Upgrade          | Cooling          | 24,473            | kwh    | 83,526      | \$1,911        |
| Water Efficiency Upgrade |                  | 10,721            | Therm  | 1,072,100   | \$15,653       |
| Totals                   |                  | 203,291           |        | 3,388,208   | \$49,365       |



# Montlake Tower Phase II Energy Analysis

Table 1. Summary of EEM Analysis – Montlake Tower.

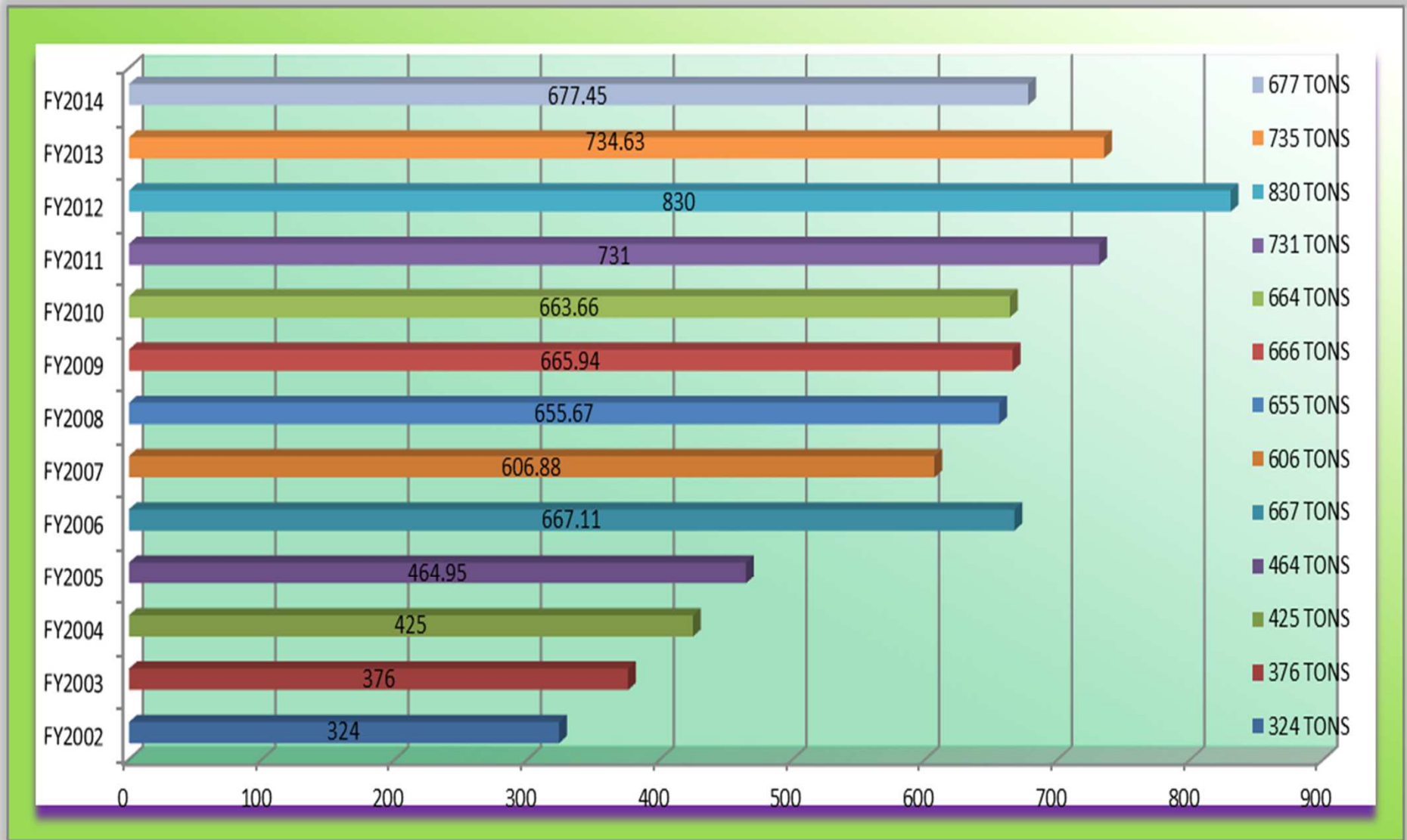
| Montlake Tower                                   | Energy Savings                                 |                     |                        |                     |                   | Cost                             |                |
|--------------------------------------------------|------------------------------------------------|---------------------|------------------------|---------------------|-------------------|----------------------------------|----------------|
|                                                  | Electricity + Steam (converted to natural gas) |                     |                        |                     |                   | Cost                             | Simple Payback |
|                                                  | Electricity                                    | Gas                 | EUI Red.               | %                   | Energy \$         |                                  |                |
| kWh<br>per year                                  | Therms<br>per year                             | Kbtu/SF<br>per year | Reduction<br>from code | Savings<br>per year | above code        | no utility incentive<br>in years |                |
| <b>PACKAGE MEASURES</b>                          |                                                |                     |                        |                     |                   |                                  |                |
| A-1: LED OR Lighting                             | 4,681                                          | (46)                | 0.04                   | 0.02%               | \$ 220            | \$ 5,250                         | 23.9           |
| A-2: Reduce Lighting Circuited Load              | 117,041                                        | (1,108)             | 1.07                   | 0.48%               | \$ 5,533          | \$ 255,946                       | 46.3           |
| A-3: Enhanced Lighting Control                   | 34,412                                         | (377)               | 0.29                   | 0.13%               | \$ 1,562          | \$ 1,089                         | 0.7            |
| A-4: Solar Load Control 2nd Floor South and East | 58,186                                         | 1,496               | 1.29                   | 0.58%               | \$ 5,352          | \$ 35,700                        | 6.7            |
| H-1: Unoccupied Turn-Down in ORs                 | 261,327                                        | 4,168               | 4.84                   | 2.18%               | \$ 20,795         | \$ 57,548                        | 2.8            |
| H-2: Enhanced VAV, Floors 6 & 7                  | 420,490                                        | 9,479               | 8.80                   | 3.97%               | \$ 36,983         | \$ 515,878                       | 13.9           |
| H-3: Zone Level HEPA Re-Circulation in All Rooms | 12,513                                         | 811                 | 0.46                   | 0.21%               | \$ 1,773          | \$ 15,600                        | 8.8            |
| P-1 Chiller and Heating Plant Optimization       | 30,921                                         | 77,247              | 28.93                  | 13.05%              | \$ 100,014        | \$ 38,231                        | 0.4            |
| <b>TOTAL- Package</b>                            | <b>939,670</b>                                 | <b>91,671</b>       | <b>46</b>              | <b>20.6%</b>        | <b>\$ 172,230</b> | <b>\$ 946,242</b>                | <b>5.5</b>     |

# UWMC WASTE MANAGEMENT

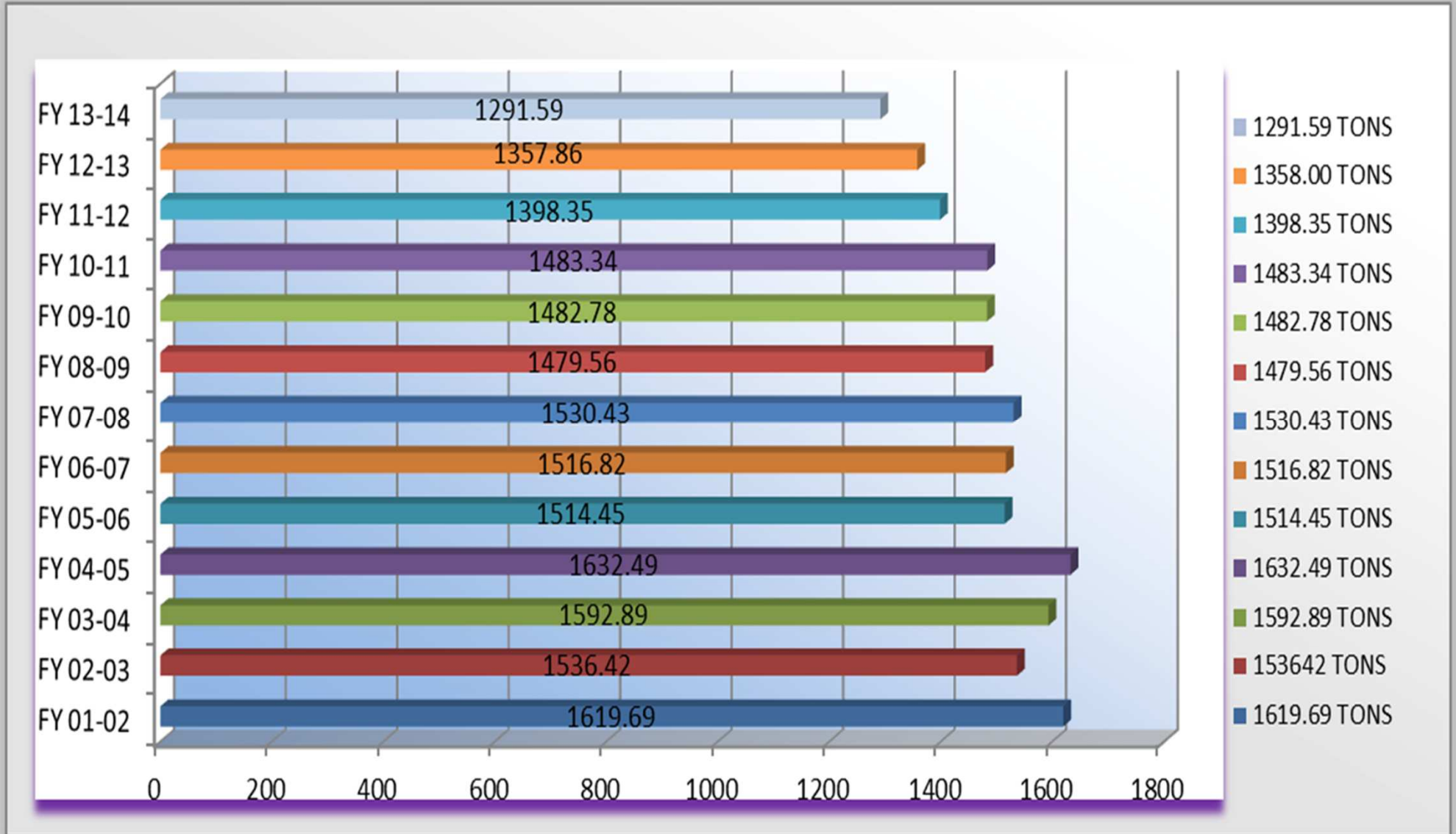
The UWMC Environmental Services and Waste Management divisions have been using the EPA Waste Management Hierarchy since 1989 to support its decision making processes regarding solid waste and hazardous waste management.



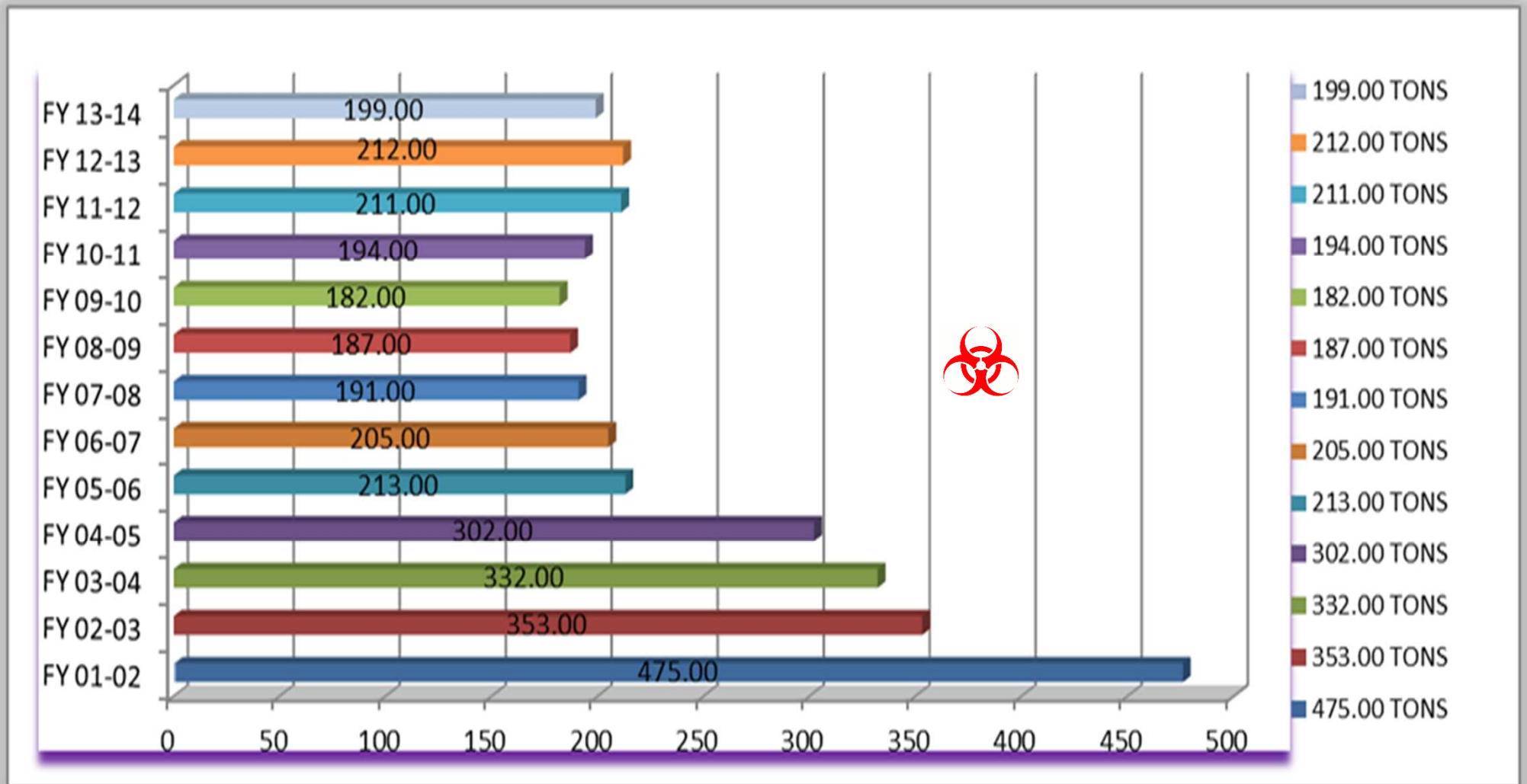
# UWMC RECYCLING



# UWMC SOLID WASTE



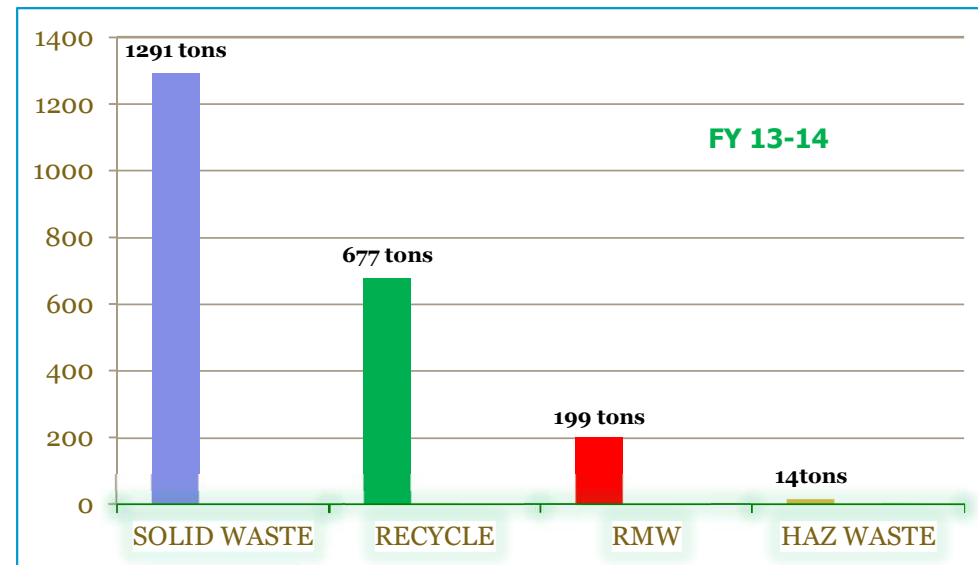
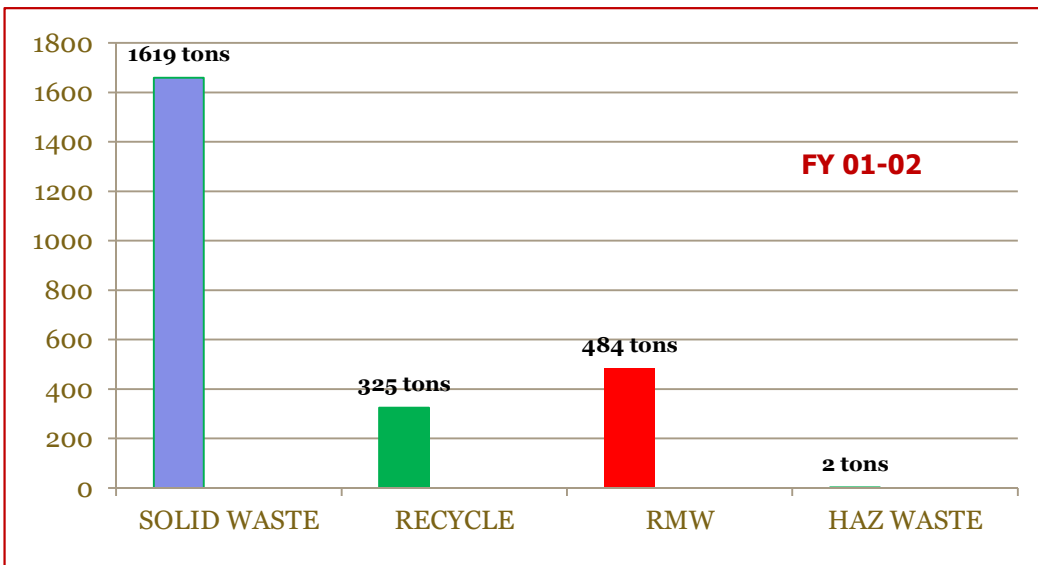
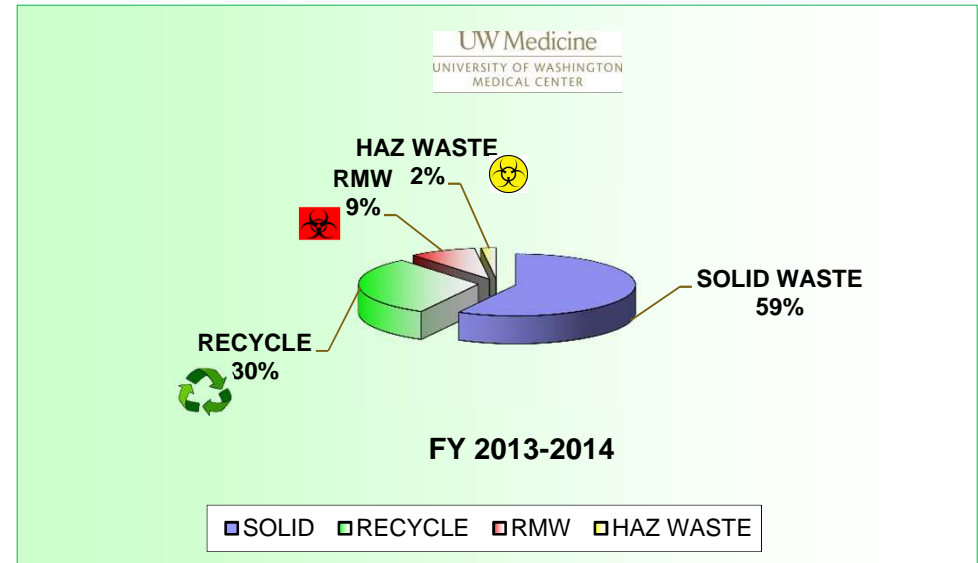
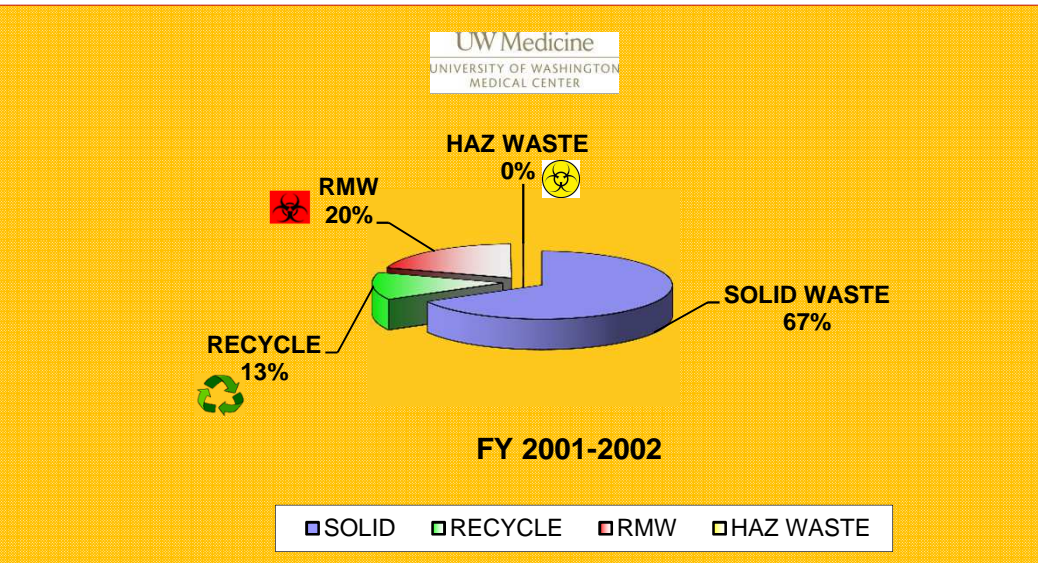
# UWMC REGULATED WASTE



# UWMC WASTE MANAGEMENT OPERATIONAL COST

| SOLID WASTE                                                     | TONS per Year Baseline | TONS per Year Previous | TONS per Year Current | Annual Costs Baseline | Annual Costs Previous | Annual Costs Current |
|-----------------------------------------------------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|----------------------|
|                                                                 | 2001-2002              | 2012-2013              | 2013-2014             | 2001-2002             | 2012-2013             | 2013-2014            |
|                                                                 | 1,616.59               | 1,357.86               | 1,291.59              | \$192,126.00          | \$249,493.00          | \$225,085.00         |
| RECYCLING                                                       | TONS per Year Baseline | TONS per Year Previous | TONS per Year Current | Annual Costs Baseline | Annual Costs Previous | Annual Costs Current |
|                                                                 | 2001-2002              | 2012-2013              | 2013-2014             | 2001-2002             | 2012-2013             | 2013-2014            |
| Recycling (Paper-Mixed Recycling - Compostable Food-Cardboards) | 324                    | 728.32                 | 668.45                | \$ 4,707.00           | \$ 27,043.00          | \$ 18,577.00         |
| Universal Waste                                                 | 1.55                   | 6.31                   | 9                     | \$ 1,422.00           | \$ 4,301.00           | \$ 2,936.00          |
| Recycling Total                                                 | 325.55                 | 734.63                 | 677.45                | \$ 6,129.00           | \$ 31,344.00          | \$ 21,513.00         |
| RMW                                                             | TONS per Year Baseline | TONS per Year Previous | TONS per Year Current | Annual Costs Baseline | Annual Costs Previous | Annual Costs Current |
|                                                                 | 2001-2002              | 2012-2013              | 2013-2014             | 2001-2002             | 2012-2013             | 2013-2014            |
| RMW Non-Sharp Treated on site                                   | 361.4                  | 152.99                 | 143.68                | \$ 274,664.00         | \$ 28,440.00          | \$ 25,039.00         |
| RMW Sharp Treated on site                                       | 113.6                  | 52.93                  | 51                    | \$ 86,336.00          | \$ 41,893.00          | \$ 47,112.00         |
| Non RCRA Pharmaceutical Waste                                   | 0                      | 0                      |                       | \$ -                  |                       |                      |
| Incinerated RMW (Trace Chemo)                                   | 9.1                    | 6.4                    | 5                     | \$ 15,720.00          | \$ 11,525.00          | \$ 10,759.00         |
| RMW Total Waste                                                 | 484.1                  | 212.32                 | 199.68                | \$ 376,720.00         | \$ 81,858.00          | \$ 82,910.00         |
| HAZARDOUS WASTE                                                 | TONS per Year Baseline | TONS per Year Previous | TONS per Year Current | Annual Costs Baseline | Annual Costs Previous | Annual Costs Current |
|                                                                 | 2001-2002              | 2012-2013              | 2013-2014             | 2001-2002             | 2012-2013             | 2013-2014            |
| RCRA Hazardous Pharmaceutical Waste                             | 2                      | 13                     | 14.7                  | \$ 6,299.00           | \$ 35,746.00          | \$ 48,471.00         |
| Non - RCRA Hazardous Pharmaceutical Waste                       |                        |                        |                       |                       |                       |                      |
| Total Hazardous Waste                                           | 2                      | 13                     | 14.7                  | \$ 6,299.00           | \$ 35,746.00          | \$ 48,471.00         |

# IF YOU CAN'T MEASURE IT, YOU CAN'T IMPROVE IT



# UWMC SUSTAINABILITY RECOGNITION





# QUESTIONS?

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