

# **Sustainable Disposal at Eugene Schools Best Practices Manual**



**written by**

**City of Eugene Solid Waste and Recycling Program  
EPA Grant # SD-98087201-0  
November 2002**

Special thanks to the staff and students at these participating schools for their successful efforts.

Patterson Elementary and Family School  
Howard Elementary School  
River Road Elementary School  
Kelly Middle School  
Kennedy Middle School  
Monroe Middle School  
Churchill High School

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## **Project Background**

### **City of Eugene Emphasis on Organics Recovery in Schools.**

The Sustainable Disposal at Eugene Schools project arose from the City of Eugene's Solid Waste and Recycling Program's experience in developing a commercial composting demonstration site in 1998. As a result of an Oregon Department of Environmental Quality waste reduction grant, the City was able to purchase and install two in-vessel composters at a large grocery store in Eugene. The purpose of this site was to demonstrate the applicability of large scale composting to businesses within the City limits. After the first year of operations at that site, one of the lessons learned was that while the equipment operated as expected, the store's expected cost saving never materialized. The high cost of labor required to source separate the vegetative waste stream and to operate the in-vessel composting equipment out paced the relatively low cost of the disposal savings. In addition, the selected store was growing so rapidly that it in fact generated additional volumes of garbage each month. City staff recognized the benefits of decreased truck traffic to the store and County staff recognized the reduction in food discards deposited into the landfill they operate. These two community-wide benefits are extremely difficult to quantify as cost-savings. Because the equipment worked so well, however, staff pursued expanding this project into schools to take advantage of the educational benefits realized from an on-site composting installation. The City of Eugene sought funding from the EPA's Sustainable Development Challenge Grant program and was notified of the grant award on April 20, 2000.

## **Project Goals**

In-vessel composting is a relatively new technology. It blends the natural process of composting with modern technology to safely compost food discards in a totally enclosed unit. The Eugene schools project installed an in-vessel composter at six Eugene schools. With a capacity of up to 150 lbs of food discards each day, it was expected that the organic portion of each school discard flow would decrease to zero. Schools in Eugene pay for disposal based on the container size and frequency of collection required for that container. Reducing the amount of the waste stream could lead to changes in the trash container size and collection frequency required at each participating school. If used to capacity, it is expected that the project may be able to save the district as much as \$10,000.00 annually on disposal, labor and soil amendment expenses. The primary objective of this project was to document the operational expenses and the disposal and materials savings to each school as a result of operating this equipment.

All of the schools have either gardens, environmental clubs, or specialized studies in natural resources. This project will include students in the activities of source separation, transportation, processing, testing and ultimately utilizing a previously wasted resource. Much of the data that is collected to show the efficacy of this projects will be collected and analyzed by the students. The secondary objective of this project is to create a curriculum related to composting for each participating school in order to advance and entuse students career and life skills.

Schools in Oregon are under enormous pressure to reduce costs due to the limited dollars available from capped property taxes. Most schools have established traditional paper recycling programs in and effort to reduce garbage collection and disposal expenses. Additional recycling programs for the collection of glass, tin and aluminum, paperboard and plastic containers have been implemented in some schools. Compostable organic materials, while making up 10-15% of the waste stream across Lane County, are

not typically recovered from school's discard streams, primarily due to a lack of processors of these materials. The relatively new technology known as "in-vessel" composting allows small generators of organic discards to effectively create compost on-site. As a result of this project, documented volumes of organic discards will be turned into a soil amendment for use on school grounds. This best practices manual will be made available for other school districts that want to pursue utilizing in-vessel composting as a way to further minimize disposal and landscape amendment expense, as well as integrating composting experience into an educational curriculum.

## **Project Partnerships**

The majority of the funding for this project comes from the EPA through their \$68,000 Sustainable Development Challenge Grant Program. Most of the EPA funds will be used to purchase and install Earth Tubes at each school. The City of Eugene will provide \$30,000 to support the purchase of equipment and partner with the EPA to hire a Compost Specialist position that will ensure the educational goals of the project are met. Each of the six schools involved with the project pledge \$1,000 to be used as in-kind support. This will primarily come from custodial staff time that will actually operate the equipment, once they have been loaded by the students.



**Siting an Earth Tub**

Finally, the district's garbage and recycling service provider, Sanipac, Inc. has pledged to contribute \$1,000.00 to be used towards containers and descriptive signs for the sites.

## **Earth Tub Description**

An Earth Tub is an in-vessel composting unit capable of composting non-green feedstocks such as cafeteria food discards. Air flow is controlled with a biofilter unit to eliminate odors, and leachate is controlled via PVC tubing and manual discharge. The cover of the Earth Tub spins to allow rotation of an auger. The vertical stainless steel auger, is powered by a 2 hp electric gear motor. The operator, pushing on one of three handles, rotates the auger around the inside of the Tub.

Six Earth Tubes, manufactured by Green Mountain Technologies, were purchased and placed at six participating schools. Each Earth Tub consists of double walled plastic with foam insulation (R-12). Each Tub weighs 300 pounds when empty and has a volume of 3.5 yards. Each Tub has the capacity to handle 100-150 pounds per day, with a total capacity of 4,000 pounds.

## **Installation Requirements**

### **Siting, Plumbing, and Electrical**

Prior to installation, School District staff were consulted and all contractual work was done to District specifications. The Tubes were sited away from classrooms and breeze ways that might be impacted by an occasional odorous event within the Tub. Hard level surfaces were chosen, or cement pads poured for the Tubes. Each fenced site is approximately 12' x 12', with five locks securing the gate, the power supply, discharge doors and receiving hatch. Five gallon tanks were placed below the concrete pads to

receive gravity fed leachate from the Tubs. Eventually, buckets and on/off valves were installed in place of the tanks to allow the operator a more hands on approach to leachate drainage. Electrical hookups for the auger motor and biofilter were installed to Eugene code specifications. Each Tub was brought in with a crane and placed in its location once site construction was complete. It is helpful to site the Tubs close to a hose bib for Tub cleaning and site maintenance, as well as a utility sink or sanitary connection for leachate removal.

### **Additional Site Accessories**

Swing arms were installed at each location to allow free movement of the electrical cable above the Tub. Operators must remember to rotate the Tub both clockwise and counterclockwise to ensure the electrical chord does not get twisted unsafely. Each site has multiple signs that explain who the project partners

are, provide safety precautions, and loading instructions. Each site has an aluminum box that covers the auger motor and slide track, which prevents the operator from reaching into the Tub in an unsafe manner. Each site has a stepladder with a specially manufactured safety rail that makes it safe for students to load the Tub using proper body posture.



**Swing Arm and Aluminum Safety Box**



**Descriptive and Safety Signs**

### **Putting the Earth Tubs Together**

The Green Mountain Technologies Operators Manual and video that came with the Tub did an excellent job describing how to install the biofilter system, and leachate lines. A plumber installed the PVC tubing for the air and leachate flow, adding a clean-out port and pressure fit connections for annual cleaning purposes.

### **Biofilter**

The biofilter is a roll cart filled with a biological medium of 80% wood chips, 20% compost, and a quart of lime. The biofilter is designed to remove any odors from the air being drawn from the Earth Tubs. The biofilter should remain as moist as a wrung out sponge in order to work properly. When the moisture level in the



**Biofilter**

filter media drops below 40%, the bacteria will go dormant, and won't be available when needed to remove odors from the Tub. It may take several days for a dry biofilter to "come alive" and work efficiently to remove odors.

## **Leachate System**

Leachate is the liquid portion that drains from the Earth Tub. When the wet food portion is unbalanced with the dry carbon portion of the compost mix, leachate seeps through the mix, through the perforated bottom and into the leachate drainage lines. Clear vinyl tubing was used to connect to the PVC drainage lines so the operator could easily see when the leachate needed to be drained. A manual on/off valve was added so the operator could manually control the flow of leachate. If the Tub contents are too dry, leachate can be added back to the Tub. If the Tub contents are too wet, leachate is disposed of through the sanitary system.



**Leachate Bucket with On/Off Valve**

Once the Tubs were in place, the leachate and aeration lines installed, and the biofilter connected, the Earth Tub was ready to be loaded. The bottom of the Earth Tub is really a "false bottom" with a perforated sheet of stainless steel that fits on top of a molded aeration and leachate drainage channel. The holes in the stainless steel allow liquids and fine sediment to pass through to the drainage channels and PVC collection lines.

To reduce the amount of small particles reaching and clogging the collection lines, the Green Mountain Technologies manual and video recommends putting a three inch layer of wood chips on the bottom to perform as a particle barrier. Some of the Tubs do not have sufficient clearance below the moving auger to allow wood chips to remain on the bottom, and the wood chip barrier soon ended up mixed in with the Earth Tub compost. One modification, taken from the Grey Bears Project in California, suggested lining the bottom with landscape fabric which would allow liquids to pass but keep small particulate out of the tubing. This method has proven sound to date. Care will be needed when discharging the Tub not to disturb this fabric liner. One yard of sawdust was added on top of the landscape fabric. At this point, the schools were ready to add cafeteria food waste to their Tubs.

## **Operations Lunchroom Sorting**

Each school was unique in how it chose to separate the organic portion of their waste stream. Each school decided which sorting method worked best for them. This allowed the students and staff to work together, and allowed greater ownership in the project for all involved. At Kelly Middle School, the custodian created an efficient sort station that allows for the recycling of paper, food waste, milk cartons, cans and juice containers. The lunchroom custodian oversees the recycling station.



**Kelly Cafeteria Sort Station**

Patterson Elementary School focused on food waste and milk carton recycling. Students take turns overseeing the sort line, with older students providing help and encouragement to the younger students. Sort buckets are elevated so students can easily place food and milk cartons into their proper container.

It took each school a couple trial runs before learning which sort system worked best for their school. Systems that caused the least amount of backup at that critical time when students want to dispose of their lunch trays and head outside to play were the most successful. These systems offered garbage disposal at the beginning, food bucket and other recyclables in the middle, and milk carton processing at the end. This allowed the “clean plate” club to toss and go, affirming principles of reducing, reusing, and eating everything on one’s plate.



**Patterson Elementary Sort Station**

Five of the six Earth Tub schools compost everything: meat products, paper napkins, paper condiment cups, paper boats, fruits and vegetables. Milk is excluded in all cases because of the likelihood that milk in the Tub would cause an odor problem. One school has chosen not to add meat products to their Tub even though the Tubs are capable of handling up to 10% meat products.

### **Plastic Contamination**

Plastic contamination is inevitable in a lunchroom setting where students want to dispose of their lunch trays as quickly as possible and head outside to play. Plastic contamination is easier and safer to remove after the composting process, when the finished compost is removed from the Tub or after it has cured. At this point it can be safely removed, or screened out. Most schools see a minimum of contamination in their finished compost, the most common contaminant is the plastic “spork”, which is easily removed from the finished product. When students discharge and remove the plastic contamination from their finished compost, a visual and kinesthetic impact is made and contamination greatly decreases. Other schools remind their students not to throw plastic in with their food by posting signs at the sort line. Contamination will always be an issue with the composting process, but with diligence, can be kept to a minimum.



**Small amounts of plastic contamination**

### **Record Keeping**

Schools were encouraged to keep records of all food waste and carbon sources going into their Tub, and how often the Tub was mixed. They were also encouraged to keep track of the Tub temperature, as this information would help determine when the compost mix had reached pathogen reduction temperatures. Students and staff were also encouraged to note characteristics of the compost mix such as what the compost mix smelled like, and if it looked like more sawdust was needed. Record keeping has proven

to be one of the keys to running a successful Earth Tub. The records serve to enhance communication between Earth Tub operators, and provide meaningful diversion numbers that help determine the effectiveness of the Earth Tub program.

### **Nitrogen Source**

The primary feedstock for the school Earth Tub is lunchroom leftovers and cafeteria discards. Students sort their organic leftovers into a five gallon bucket, while the cafeteria staff sort organic discards into a bucket of their own. Staff lunchrooms also provide an additional source of food discards and coffee grounds. These sources of food waste average 30 pounds a day at each of the schools. Other nitrogen sources available to schools, either on-site or off-site, consist of grass clippings, coffee grounds from the corner coffee cart, and organic and synthetic fertilizers.



**Cafeteria Food Waste**

### **Carbon Source**

Carbon is essential to balance the high moisture/high nitrogen feedstock coming from the cafeteria and lunchroom. Course sawdust has been the carbon source that has worked well for the schools. Some schools have expanded their program to add paper towels from the restrooms, shredded paper from the copy room, and leaves from the school grounds. One school has a wood shop program that contributes fine sawdust to their Tub. The City of Eugene has a leaf collection program in the Fall, and some of schools have leaves delivered to be used in their Tubs. A consistent source of carbon for the Tub is critical to successful Tub operation. Other options can include a delivery of free wood chips from a friendly arborist.

### **C:N Balance**

The Earth Tubs are designed to be loaded with large amounts of carbon, which allows food waste to be added on a daily basis for some time before additional carbon needs to be added again. It is important to recognize the signs that tell the operator more carbon is needed. The first trouble sign is an odor of ammonia emitting from the Tub. This means that nitrogen is escaping, and more carbon needs to be added to balance the excess nitrogen. Daily mixing will also help incorporate oxygen into the compost which will improve the smell. And lastly, making sure the biofilter is turned on and operating well.

Other malodor associated with composting can be described as the smell of vinegar and rotten eggs. The smell of vinegar, and rotten eggs, are both indications that the Tub needs more carbon, daily turning, and an active biofilter. A healthy Earth Tub is warm and sometimes hot and steamy. The smells are that of decaying organic material, which may smell like citrus, bread dough, hot grass clippings, and earth.

The second trouble sign for an Earth Tub is compost that looks pasty and gummy. The solution is the addition of large amounts of carbon and a good mixing until the compost looks crumbly and fluffy again. It is important for students and staff to observe the compost mix and trust their eyes and noses to tell them when the balance is off in the Tub. While there is solid science behind every composting endeavor, there is also an art to composting which is learned through experience.

## **Oxygen**

Incorporating oxygen into the compost is essential to avoid odors and facilitate the production of aerobic bacteria. Oxygen is incorporated manually by using the auger to lift and mix the material while rotating the lid. Mechanically, oxygen is moved across the head space of compost mix by turning on the biofilter. Oxygen exchange through the compost mix is enhanced with the use of bulky carbon sources such as wood chips. Oxygen exchange is hindered with the use of large amounts of paper that tend to compact.

## **Mixing Requirements**

While mixing incorporates oxygen into the compost, its primary purpose is to mix the freshly added food into the active compost mass. Food that is left on top quickly becomes the target of fruit flies, house flies, and soldier flies. Mixing after each addition of fresh food keeps the exposure of food to a minimum. Should flies lay their eggs on the surface of the compost, frequent mixing incorporates eggs into the hot compost mass, effectively killing them before they have a chance to hatch and become a nuisance. Ideally, the Earth Tub should be turned daily. At a minimum, the Earth Tub should be turned on a Tuesday- Friday schedule. If flies and odors become an issue, then turning is required along with the addition of a carbon source such as sawdust, leaves, or wood chips. A shovel should be used on a weekly basis to scrape the compost and raw food from the inside wall of the tub for complete mixing.

It is important for the operator to be aware of the electrical chord at all times. The chord needs to be clear of the rotating auger which can slice through an electrical chord. Chord kinking occurs when the Tub is rotated in the same direction all the time, twisting the chord upon itself. The chord needs to be manually untwisted if the lid is rotated in the same direction. Chord kinking can shorten the length of the chord placing stress on the chord attachments or unplugging the Tub altogether.

A simple solution that prevents the chord from twisting on itself is to first rotate the lid counterclockwise in a complete circle, move the auger to the center of the Tub, and then rotate the lid in a clockwise direction.

## **Moisture and Leachate**

The mix of carbon and nitrogen materials in the compost mix needs to be as wet as a wrung out sponge. Most food wastes tend to be as high as 80-90% water, so adding water to an Earth Tub is rarely an issue. Dry Earth Tubs occur during hot summer conditions when water is evaporating and food additions are scarce. Tubs that drop below 40% moisture stop decomposing until additional water is added by using a hose or high moisture grass clippings or food waste are added to the Tub.

Usually the Earth Tubs had the problem of too much water. Excess water was drained off as leachate, resulting in as much as two to three gallons a day during the rainy months. Winter rains may have been seeping into the Earth Tubs, so a tarp was used to cover each of the Tubs. While a tarp kept the Tub from getting any wetter, the Tub was not getting any dryer. The tarp may have prevented the normal evaporation of moisture from the Tub, but tarp condensation may have made the problem worse. The best response came with the addition of dry sawdust to the Tubs, and judicious use of the tarp during periods of rain. Further experimentation during very wet conditions is needed.

## Temperature

Temperatures for the Earth Tub range from ambient to over 150 degrees. The EPA's Process to Further Reduce Pathogens (PFRP) states that the temperature within the in-vessel Earth Tub must be maintained at 131 degrees for 72 hours before the compost can be discharged. Temperature is affected by air flow, carbon, and nitrogen availability. We found that cafeteria food waste provided enough nitrogen for sufficient bacterial populations. Most of the Tubs hummed along with temperatures ranging from 90 to 120 degrees. If a Tub wasn't reaching pathogen reduction temperatures before a planned discharge, grass was added to boost the temperature above 131 degrees for three days before discharge. At this point the compost had met the EPA's PFRP process, and was safe to discharge. The compost was still biologically and chemically hot, and would need further curing either within the Tub or in a separate curing pile.

As an operational note, it is important to understand that the plastic inner wall of the Tub flexes and bubbles with the change in compost temperature. This can cause the auger to strike the inner wall one week, and not the next. It is important for the operator to listen for the rhythmic thumping of the auger striking the inner wall, and adjust the auger towards the center when this happens so the inner wall of the Tub does not sustain heavy damage.

## Finished Compost

Discharging the compost is accomplished by opening the side discharge doors and moving the auger in front of each doorway. A shovel was needed to remove the compost that didn't fall out with the help of the auger. A tarp on the ground is used to catch the falling compost. Compost was then screened if necessary, or moved to a curing pile.

If a discharge was needed during the school year, it was planned for the end of winter and spring break, to allow as much cooking time in the Tub before discharge. The end of summer also proved to be a good time to discharge the Tubs after allowing the compost to cure inside the Tub for the summer.

Screened compost provided a more finished product, and was popular among the schools that had vegetable gardens. Plastic contaminants were removed and larger wood chips were added back to the Tub for a second round of composting. Schools that didn't have gardens donated their compost to a nearby community garden or to the school district itself. The school district grounds crew used the compost to mulch around newly planted trees.



**Discharging Finished Compost**

## **Compost Testing**

A representative sample of compost was taken from Tubs at Monroe Middle School and Howard Elementary School. One sample was tested at Agri-Check Agricultural Testing Lab in Umatilla Oregon, after it had gone through a PFRP process of 131 degrees for 72 hours. The primary carbon source for this Tub consisted of coarse sawdust, and leaves. According to Agri-Check, the Earth Tub compost is "great looking stuff". They tested for available nutrients, soluble salts, available carbon, and C:N ratio. This compost can be used to mulch around existing planting beds or to ammend existing soils with as much as 25% compost. The C:N ratio is 21:1, meaning this compost will not rob the soil of nitrogen as it is applied. The N/P/K is roughly 3-1-1, making the compost a low nutrient value fertilizer. The soluble salt content at .9 % dry weight is on the high side due to the high salt content of cafeteria food. These salts will rinse out with the first watering or good rain.

BioVir Laboratories, Inc. in Benicia, California provided fecal coliform and salmonella assays for two Earth Tub samples. The compost samples came back "none detected" for salmonella per 4 grams total solids, and were within EPA's standard for Class A Biosolids for fecal coliform per 4 grams total solids. These tests showed this compost could be used without restriction. Test results were forwarded to the school district's risk services office. In a nutshell, the application of this compost material will not pose a problem to soils, plants, or persons.

## **Tub Maintenance**

Tub maintenance is best done when the Tub is empty. Tighten all the nuts and bolts both inside and outside the Tub. Lubricate the auger track, wheels, and add grease to the auger stem via the auger nipple. Spray out the air and leachate lines, and spray out any residual compost under the perforated grate. Inspect the inside of the Tub for wear from the auger, and install a shim on the track if needed. Empty the biofilter contents into the Tub and refill the biofilter with 80% wood chips, 20% compost and a quart of lime.

**Costs**  
**Capital Costs**

The capital costs are listed in the table below. It cost approximately \$10,886.00 per school to install each Tub. Additional costs were incurred when one school chose to end their program and the Tub was moved to another school. Each school contributed \$400 relocate the Tub, while the City of Eugene paid for all additional expenses (these costs were not paid for with grant funds). The City of Eugene also used it's flat bed truck and crane to move the Tub.

6 Earth Tubs @ \$6,650.00	\$39,900.00
Electrical services	\$10,065.15
The 6 foot high perimeter fence and concrete slabs	\$12,965.46
Electrical cord swing arm construction and installation	\$ 900.00
Plumbing installation	\$ 618.54
Wheelguards for Tubs	\$ 870.00
Total	\$65,319.15 / 10,886.53 per school

**Operational Costs**

While each school varied in staff and student participation, it took an average of one hour of staff time per week to oversee the Earth Tub operations. Considerably more time was spent by student and parent volunteers, overseeing the sort process in the cafeteria, overseeing the mixing process in the Tub, discharging compost, and adding fresh sawdust. The manufacturer stated that electrical costs for the biofilter and auger motor run approximately \$100.00 per year. Each Tub received one to two yards of sawdust throughout the year which was supplemented with additional carbon sources that were available at no cost (leaves, paper, wood chips). Earth Tub operational expenses average \$664.00 per year.

<b>Requirement</b>	<b>Cost</b>
Labor	\$540/Tub/year (\$15/hr.)
Electricity	\$100/Tub/year
Bulking agent/carbon source	\$ 24/Tub/year
<b>Total Costs.....</b>	<b>\$664/Tub/year</b>

## Volumes Diverted - Material Savings

Average diversion volumes have been calculated for each of the six schools. The participating high school with its open campus at lunch diverted the least, averaging 15 pounds of food waste per day, primarily from the kitchen. The elementary schools diverted the most waste, averaging 30 pounds per day, from the cafeterias and kitchens. Altogether, the six schools diverted just over 11 tons of food waste per year from the waste stream equaling in volume to 60 yards. Additional savings were realized as each school utilized three yards of compost for their school gardens, saving the School District from purchasing 18 yards of compost at \$12 per yard.

<b>Garbage Volumes and Costs for all six Earth Tub Schools</b>	
<b>Garbage Volumes</b>	<b>Garbage Costs</b>
148 yards/month	\$1,683/month
1,332 yards/year	\$15,147/year
<b>Food Waste Diverted and Savings for all six schools</b>	
6.6 yards/month or 60 yards/year	<b>\$682/year = 4.5% of total garbage costs</b>

The Eugene school district contracts with a local hauler for garbage and recycling services for the whole district. The specific costs for each school can be determined by examining the size of the garbage container and the frequency of collection. Two of the participating schools reside outside of the City limits, and are not charged for garbage service.

Immediate benefits are seen at each school with the three yards of compost produced each time the Earth Tub is discharged. This amounts to at least 18 yards of compost the school district does not have to purchase for garden projects and tree planting. The project was a vehicle for educating and enthusing students about waste reduction. Environmentally, 11 tons of putrescible waste per year were kept out of the landfill. The school district to date has not negotiated for a reduction in their garbage contract to reflect the savings in the table above. City staff continue to work with the school district to realize these savings, and additional savings to be had by decreasing the size of garbage containers and reducing the frequency of collection.

## Outreach Efforts

- Outreach efforts to the public and within the school district were numerous throughout the course of the Earth Tub project. Within the first year, a public kick-off event was held highlighting the Sustainable Disposal project at Eugene Schools along with a City-wide worm bin sale. Over 150 worm bins were sold, and representatives from each school received compost program awards.

A Eugene city councilor made a project presentation after the first batch of compost was released from the Earth Tub for a public demonstration. TV news crews were on hand to interview teachers and students involved in the project. Bags and buckets of fresh compost were given away.

- Students at a participating middle school worked with the local food bank garden coordinator to spread compost over a garden plots used to grow food for local families in need. Students also worked with School District 4J grounds maintenance staff to discharge compost to be used on school grounds.



**Kick-off Event and Worm Bin Sale**

- Earth Tub school teachers were sponsored by the City of Eugene to attend the 2000 and 2001 Green Schools Summit, and the 2002 Association of Oregon Recycling Spring Educational Conference.
- City of Eugene staff have had the opportunity to talk about the Sustainable Disposal at Eugene Schools Project at numerous conferences and events both within the City of Eugene and Nationwide.

Conferences included:

2001 National Recycling Conference presentation entitled “Special Event Recycling”

2001 Association of Oregon Recycling Conference presentation entitled “Barriers to Food Waste Composting”

2002 National Recycling Conference presentation titled “Composting Meat Contaminated Food Discards”

Events included:

2001 Lane County Fair Compost Information Booth

2001 OSU Extension Service Compost Specialist Training

2001 Composting Curriculum Teacher In-Service

- Two city wide worm bin sales were held at Earth Tub schools to enhance community educational efforts. The first worm bin sale occurred in 2001 at the Earth Tub kickoff event and again in 2002 at Patterson Elementary and Family School. Earth Tub schools received a portion of the worm bin sales to support their Earth Tub programs.



**Happy Customer**

- The City of Eugene Solid Waste and Recycling Website lists the Earth Tub project, along with several 4J School District School Sites. See [www.eugenerecycles.org](http://www.eugenerecycles.org)

## **Educational Opportunities**

### **Composting Curriculum For Elementary and Middle Schools**

Two composting curricula were created with the assistance of experienced 4J school teachers. Each teacher created a curriculum emphasizing composting and waste reduction activities specific to either elementary or middle school levels.

#### **Elementary Curriculum:**

Provides lessons and ongoing activities that enable children to have an active part in reducing the amount of garbage that is filling up the landfill. This curricula covers multiple subjects from waste reduction, reuse, and recycling, to composting and vermicomposting. Activities and subjects included in this curricula: waste audit, reduction, reuse, recycling, landfill dynamics, soils, macro and micro-organisms, compost card game, vermicomposting, plant growth experiments, and music sheets that “sing the praises” of composting and waste reduction. The elementary curriculum is organized with separate sections for grades K-3 and 4-5. Each section incorporates science, math, writing, art, spelling, reading and creative problem solving. Benchmarks are stated to some activities to assist teachers in their efforts to satisfy educational objectives.

#### **Middle School Curriculum:**

Provides science oriented lessons and ongoing activities around composting and vermicomposting. Activities, experiments and subject included in this curricula: waste audit, composting methods, microscopic identification of compost organisms, the compost food web, seed germination, plant growth trials, and water holding capacity of compost.



**Copies submitted with 9/1/01 - 2/28/02 Progress Report**

### **Teacher Training**

An educational “In-Service” teacher training was held the second year of the project to present the two curricula and assist educators who wished to incorporate composting and waste reduction methods within their classrooms. Educators interested in using the two curricula attended this one day workshop

and learned how to use the curriculum specific to their grade level. Teachers appreciated the fact that the curriculum presented realistic goals and objectives listed for each activity. Teachers also appreciated the hands-on aspect of the training and the chance to go through some of the activities contained within each curriculum.



**Exploring a Worm Bin**



**Observing Protozoa**



**Compost Card Game**

### **Expanded Compost Education**

Early on the Earth Tub schools embraced an expanded compost education program within their schools.

- ★ Howard Elementary, all 400 students were taught about Earth Tub composting, backyard composting, and vermicomposting.
- ★ Patterson Elementary and Family School put the Earth Tub site on the school's introductory tour for all new students. Teacher David Babcock developed and is currently using the Elementary School Curriculum. They have several worm bins in their classrooms. Several teachers have attended advanced training in composting and recycling. In the near future, the school plans to become a Green School.
- ★ River Road Elementary diverts food waste to use in their school garden. They have a worm bin in all 14 classrooms. They plan to become a Green School.
- ★ Churchill High School's Rachel Carson Center worked with the University of Oregon's School Garden Project and OSU Extension Master Gardener Compost Specialists to expand compost education within their program. They plan to become a Green School.
- ★ Kennedy Middle School science students receive a compost presentation each year, actively participate in Earth Tub composting, as well participate in composting and gardening at the nearby community garden.
- ★ Kelly Middle School science teacher Dustin Dawson wrote the Middle School Curricula, giving his students first hand experience with the curriculum and it's author. Head custodian John Churchil designed the "cadillac" of cafeteria sorting carts.
- ★ Monroe Middle School students divert 30 pounds of food waste each day, and donate their compost to the local community garden.

## Waste Audits and Expanded Recycling Efforts

Waste Audits were completed at each participating Earth Tub school to show students how to sort and collect organic discards and other recyclable materials such as aluminum cans, plastic drink containers, brown paper bags, paper and milk cartons. Many schools discovered that 25% of their waste stream, by weight, was food waste. After the Waste Audit, Churchill High School found that 30% of their waste stream could be composted or recycled. They expanded their recycling program for cans, drink containers, and paper, and reduced the amount of recyclables in their waste stream to 10%.

With the money redeemed from the aluminum cans, the recycling program buys pizza once a month for the custodians. Any remaining money supports the school recycling program.

### Other Innovative Efforts

Patterson Elementary School Teacher David Babcock took an innovative approach to waste reduction gleaned at a Green School Summit Conference. It was discovered that Patterson students were taking extra food at lunch, ensuring they would have food left over to contribute to the Earth Tub program. Upon this discovery, David implemented the “Clean Plate” lunch program where students are encouraged to take only what they can eat. When they finish their meal, the clean plate students get their name added to a drawing at the end of the week for a free snack from the cafeteria. This reduced the amount of food being wasted, made the cafeteria cook much happier, and taught the students to be judicious about their food selection choices.

Three of the six Earth Tub schools wish to continue their recycling efforts beyond the Earth Tub program and plan to participate in the Oregon Green Schools Program.



**Churchill High School Waste Audit**



**Monroe Middle School Waste Audit**



**Patterson Waste Audit Results**