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# The Green Issue

# GoddardView

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## Celebrate Earth Day—April 22

By Sarah Dewitt

Earth Day was born in 1970 as a result of attempts by former Senator Gaylord Nelson to include conservation on the political agenda. Earth Day, April 22, was declared a day to express environmental concerns and increase conservation.

In celebration of our Center's numerous conservation efforts, Goddard will again recognize Earth Day on Wednesday, April 22, 2009. Planting of native greenery in the rain garden will take place after Earth Day on April 30. The Rain Garden will beautify Goddard's landscape and facilitate the infiltration of storm water into the ground to filter pollutants and allow groundwater resurgence. On May 5, come out and help remove invasive plants that pose a threat to our wetlands. We'll teach you about invasives and why they are detrimental, and how to identify the three species of concern. The event will begin at 10 a.m.

Earth Day activities begin with a morning presentation in the Building 8 Auditorium on the impact of urban growth on local metropolitan areas. Presenters include Jeff Masek, Lahouari Bounoua, and Laura Rocchio of Goddard's Biospheric Sciences Branch. Goddard's environmental conservation programs along with some Earth science missions will be on display in the lower lobby of Building 8. Employees can also challenge their recycling knowledge during the Recycling Olympics event. This timed activity brings a better understanding and awareness of the various materials that are recycled at Goddard.

The Goddard Digital Learning Network is teaming with director and violinist Kenji Williams to present an out of this world experience known as Bella Gaia (Beautiful Earth). This one-of-a-kind multimedia journey of Earth from space will be presented to students and teachers around the world during two Web casts on Wednesday, April 22 at 10 a.m. and 2 p.m. EDT. Portions of the event will be televised on the NASA-TV education channel.

A showcase of environmentally friendly vehicles of Goddard employees will be in the Building 8 West parking lot starting at 11:30 a.m. At noon, meet some of Goddard's cycling enthusiasts at the Goddard Bike Rally on April 22 in the Building 8 parking lot. Cycling enthusiasts will show off their slick new road bikes and favorite gear. Learn the ins and outs of commuting by bicycle, like where to take a shower on Center and where to store your bike. Learn how you can get involved with lunchtime group rides and weekend outings with Goddard cyclists. Let your voice be heard in the discussion of issues facing Goddard cyclists: safe routes to work, funding for bike storage, bike-pedestrian safety, bike sharing programs, and more. Also, get information on other commuter programs available to employees including carpooling, bus routes, and Smart Benefits.

The afternoon Earth Day event includes a special 50th Anniversary presentation in the Building 8 auditorium on Goddard's land use. See how Goddard's land has changed over the past 50 years. Alan Binstock, Goddard Master Planner, will share images of Goddard's past land use and plans for future land use. Come early for both auditorium events and enjoy morning refreshments and cake in the afternoon, sponsored by the NASA Federal Credit Union.

For all of Goddard's Earth Day activities, visit: <http://earthday.gsfc.nasa.gov>. ■

## Table of Contents

### Goddard Updates

Celebrate Earth Day—April 22	– 2
Goddard Conserves Energy	– 3
The Tree of Life	– 4
Stormwater Management at Goddard	– 5
Recycling Through the Years	– 6
Composting at Goddard	– 7
Code 597 Puts Green into Cleaning	– 8

## GoddardView Info

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**Managing Editor:** Trusilla Steele

**Editor:** John Putman

**Deadlines:** News items and brief announcements for publication in the Goddard View must be received by noon of the 1st and 3rd Wednesday of the month. You may submit contributions to the editor via e-mail at [john.m.putman@nasa.gov](mailto:john.m.putman@nasa.gov). Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

## Goddard Conserves Energy

By Trusilla Steele

In January 2007, Federal Agencies were mandated to become more energy efficient, increase the use of renewable fuels, and reduce greenhouse gas emissions by cutting their energy consumption 30 percent by the year 2015.

By meeting such mandates, Goddard will continue to reduce its energy usage, increase sustainability, and provide savings. Every dollar spent on energy is a dollar taken away from funding institutional support.

Goddard has taken great steps towards meeting these mandates and as a result, energy usage reduced 15 percent from 2003 to 2008. We should be proud of our accomplishments. Goddard is second in the Agency for reducing the most energy and the first Federal facility to utilize methane gas from a nearby landfill. Such gas is used in three boilers that produce steam, heating 31 buildings on Center. A report from the Environmental Protection Agency said emissions reduction as a result of this project is, "...equivalent to taking 100,000 cars off the road per year or planting 68,000 acres of trees." This landfill gas provides 60 percent of the Center's heating needs.



Photo credit: Chris Gunn

*Caption: Landfill Gas Processing Plant, Sandy Hill Landfill. This plant purifies the gas before sending it to Goddard.*

Another contributor to Goddard's energy reduction is the light motion sensors that are in many offices, which automatically turn lights off when not in use. The heating, ventilating, and air conditioning (HVAC) cycling also reduces electrical power usage by turning off select HVAC systems during non-working hours. In addition, Goddard has implemented a Load Shedding plan, known as "Gold Days," to reduce the electrical load during high demand times. This plan saves between \$100K and \$200K each year by reducing energy consumption, at key times, which has led to lower electric rates.

Installing automatic water faucets and low flow urinals in most bathrooms on Center has contributed to less water usage. Goddard's Water Conservation Program also utilizes well water at the power plants to reduce our use of locally provided water.

Goddard's renewable energy program includes future construction of two wind turbines at Wallops Flight Facility which will provide 30 percent of Wallops' electricity. Wallops is also planning to decentralize their boiler plant, significantly reducing its reliance on traditional fossil fuels with an expected energy savings of 18 percent.

Occupants of Building 25 at Greenbelt can look forward to another example of renewable energy and more controlled building temperatures when a Geothermal Heat Pump system (GHP) is installed. The GHP system will use the earth's soil as the medium of heat transfer. This system will replace the HVAC units inside Building 25. The stability of the underground temperature throughout the year makes it an ideal energy source for heating and cooling, therefore, Goddard will use this system in lieu of funding a construction project to replace 4,740 feet of failing steam, condensate, and chilled water lines.

Goddard has made significant reductions. There is, however, a need to make further reductions. "You Have The Power" to contribute by turning off lights when not in use, using energy saving features on computers and monitors, and supporting load shedding "Gold Days" by reducing energy use even further. Keep in mind that if everyone makes small reductions, it will produce a significant impact.

Beginning April 22, on Earth Day, Goddard's Energy Green Team will implement new strategies to increase conservation practices and to bring more awareness. All employees are requested to participate in "Kil-A-Watt," a building energy reduction competition. This effort already exists at Wallops. Employees in each building on Center in Greenbelt will be notified of their building energy usage on a quarterly basis, bringing awareness to the amount of energy reduction their building achieved. After each quarter, the building with the highest energy reduction will be acknowledged in a special way. In addition, you will see more energy conservation reminders and special events.

As an Agency that studies various environmental impacts to our Earth and makes many Earth science contributions, we should continue to be good stewards, of our environment: showing our "power" to practice conservation in every aspect. Remember to recycle, reduce electrical and water usage, and participate in sustainability efforts. You have the power. ■

## The Tree of Life

By Rob Gutro

Two of the unique features of the new Exploration Sciences Building aren't even in the building. They're outside. One is a giant Willow Oak tree, and the other is the "Green Edge."

Architects and builders have made the towering Willow Oak Tree located on the north side of the building a feature of the building's landscape. The men and women working the construction of the building have come to call it the "Tree of Life."



Photo Credit: Debora McCallum

*Caption: The "Tree of Life" watches over the Exploration Sciences Building.*

The Maryland Forest Service, part of the Maryland Department of Natural Resources, classifies the Willow Oak as a large specimen tree. The definition of a specimen tree varies from person to person. Some consider especially old trees as specimen trees. Others believe that trees with exceptional beauty are the ones that stand out as specimen trees. Others will only consider trees that have reached a certain height. The State of Maryland keeps track of specimen trees and Goddard's "Tree of Life" is one of those.

The Willow Oak is also known as *Quercus phellos*. They grow to a height of 50 to 100 feet, and their canopy spreads out to between 30 and 70 feet. It's a fast growing oak with willow-like foliage and a good shade tree, according to the Maryland Forest Service. It does well in full sun or semi-shade.

The Willow Oak has been purposely untouched, so that it will become a centerpiece for bringing people together, just like the lobby inside the Exploration Sciences Building, where conference rooms, stairways and the café meet. A retaining wall has been built around the "Tree of Life" and it will also soon be surrounded by picnic tables so employees can enjoy eating and drinking and discussions around it.

The "Green Edge" is the vegetated area located in the back of the new building. It's a run of vegetation that spans the length of the building and will connect to the woods behind Building 16W, making for a long stretch of woodlands. There's already a wooded area between Buildings 33 and 32, and this extended wooded area will encourage people to walk from Buildings 33 to 32 to 34.

Although there are a lot of special features inside Goddard's green building, there are a couple of special features outside, too, and architects hope the employees will appreciate and take advantage of them.

For more information about Maryland Specimen trees and plants, visit:

<http://dnr.maryland.gov/criticalarea/trees.html>. ■



Photo Credit: Debora McCallum

*Caption: The "Green Edge" outside the Exploration Sciences Building.*

## Stormwater Management at Goddard

By Lori Levine

Stormwater discharges are a leading cause of pollution in the Chesapeake Bay, the largest, most biologically diverse estuary in the United States. Stormwater is precipitation, such as rain or snowmelt, or runoff from land, rooftops, and other impervious surfaces that flows directly into the stormwater system or surface waters. Stormwater does not go through a water treatment plant; therefore, pollutants, such as oil and grease, fertilizer, trash, sediment, and chemicals accumulated in the runoff go untreated directly into our waterways. Once it reaches surface waters, it can cause a host of problems. For example, sediment clouds water and blocks vital sunlight from submerged plants, and nutrient-rich phosphorus and nitrogen cause excessive algae growth. When algae decompose, they reduce or eliminate oxygen needed by aquatic life to survive.

Goddard implements pollution control practices to minimize the impact our activities have on streams, rivers, and, ultimately, the Chesapeake Bay. Such prevention measures include sediment and erosion controls, hazardous material substitution with less or non-toxic alternatives, and waste minimization.

Goddard also incorporates Low Impact Development (LID) designs where possible to reduce stormwater volumes and improve water quality. These designs allow the stormwater to be filtered through a natural system before it runs off into surface waters, and puts it back into the water table to recharge ground and surface water. Examples of LID designs include bioretention areas/rain gardens, green roofs, pervious pavement, meadows, vegetative swales, rain barrels, smaller pavement widths, and elimination of curbs and gutters.



Photo courtesy of Code 250.

*Caption: One of many storm drains painted by Goddard employees.*

In 2008, GSFC created a bioretention basin in front of the building 32 parking area. Bioretention basins are shallow, landscaped depressions that reduce the velocity of runoff and allow the water to percolate through the soil where it undergoes physical, chemical, and biological processes that remove many of the pollutants before it flows into surface waters.

As part of our efforts to improve local surface waters, we create opportunities for employees to become involved with projects aimed at protecting water quality. Past outreach activities included a Center clean-up activity and stenciling "Chesapeake Bay Drainage" on storm drains at Goddard to remind employees that storm drains are not trash cans; everything that goes down them ends up in our waterways. This year, Goddard is planting a rain garden to help minimize our stormwater runoff impact on local waterways and to educate employees on a great example of a beautiful LID element that they can even incorporate in their own yards. Employees can sign up to volunteer for the dig, planting, or both at <http://earthday.gsfc.nasa.gov>.

For more information about Goddard's stormwater management program, contact Lori Levine at [Lori.M.Levine@nasa.gov](mailto:Lori.M.Levine@nasa.gov) or read some of Goddard's Environmental Bulletins at: <http://environment.gsfc.nasa.gov/environmental-outreach.html>. ■



Photo courtesy of Code 250.

*Caption: A bioretention area outside Building 32.*

## Recycling Through the Years

By Darlene Squibb

The Goddard recycling program has been in existence since the early 1990's. The early recycling programs for white paper and aluminum cans are credited to the efforts of volunteers from the Conservation Club. As more Executive Orders came into play around 1993, and twice superseded to strengthen recycling and purchasing of recycled content, the Facilities Management Division took in house most the typical office commodities that we have today and moved the program from a pilot program to a full program where there is collection in every building for drink containers (aluminum, glass, and plastic), white paper, mixed (colored) paper, cardboard, and laser toner cartridges. The Safety and Environmental Division has taken on the outreach efforts as a partnership with all the Goddard recycling activities. Outreach programs began around that time with a pilot green team. America Recycles Day was created in 1997 as a government and private partnership to give a day of recognition to recycling (<http://www.americarecyclesday.org>) and Goddard has held a celebration since it was instituted. It has been a showcase of Goddard's recycling efforts, including recycling education involving our children from the Goddard Child Development Center.

In 2005, Goddard implemented an Environmental Management System (EMS). Solid waste disposal was ranked as a high-priority issue for the Center, and an EMS goal of reducing waste going to the landfill by 30 percent from a 2005 baseline was established. The waste reduction green team reformed in 2006 and today has a multi-directorate membership of all

types of Center employees and recycling program managers for the purpose of outreach. A Web site was created, <http://recycling.gsfc.nasa.gov>, in 2007 to pull all the information together for center employees on the various recycling programs.

The solid waste goal was achieved by 2007 and has far exceeded the 30 percent goal. At the end of the fiscal year 2008, the waste going to the landfill was down by 39 percent, and it appears to have a correlation with the Center going to once a week trash. Goddard's recycling tonnage has steadily increased, and mostly driven upward more by special projects. Goddard's recycling rate is up to 65 percent in FY2008 largely as a result of the new building construction project under the Leadership in Energy and Environmental Design (LEED) guidelines. This project materials management is a strong part of the LEED requirements, and construction waste is managed and recycled. This drove our rate up from about 32 percent of typical center recyclables.

And just where does all this information go, and what impact does it make? Goddard submits a report to NASA Headquarters for each fiscal year. The Agency as a whole reports each year to the Office of the Federal Environmental Executive. An environmental scorecard is submitted on all Agencies for their environmental performance to the Office of Management and Budget. It is noticed, and it is important. ■



*Caption: Rick Obenchain talks to kids from the Goddard Child Development Center about recycling.*

Photo Credit: NASA

## Composting at Goddard

By Janine Pollack

All organic material eventually decomposes. Composting is simply a way to speed up this natural process by providing an ideal environment for the bacteria, fungi, insects and other organisms that do the work of decomposing. Composting is not a new idea. In fact, it was practiced by the ancient Egyptians, Greeks, and Romans, and is even mentioned in religious texts. Over the past 25 years or so, this age-old practice has been seen in a new light, developing into a robust waste-management technology.

With organic materials making up roughly 50 percent of all wastes disposed in landfills, Goddard decided to minimize our organic waste where possible, and turn it into a resource. We partnered with the U.S. Department of Agriculture's Agricultural (USDA) Research Service, one of our federal neighbors. They had an established composting facility and were in need of materials to use in composting research. As a pilot project, last year we began collecting food preparation scraps (trimmings from salad bar items, etc.) from the Building 21 cafeteria and sent those off to USDA. To date, nearly 1,000 pounds of cafeteria waste have been diverted from the landfill.

Attempting to build on the success of the cafeteria composting, we next decided to branch out and "green" at last summer's LaunchFest event. This

one-day open-house was a wonderful way to showcase all of the amazing things Goddard does. We also wanted to minimize the environmental impacts from the festivities and be responsible stewards of the environment. As a result, we asked food vendors to comply with our "green rules," which required the use of compostable food service ware, such as cutlery, plates, and cups. We then enlisted numbers of volunteers to serve at our waste stations, where visitors brought their waste which we then sorted into compostable, recyclable, or trash. At the end of the day, we transported over 500 pounds of compostable material to the USDA.

Finally, to close the loop on this composting adventure, Goddard will be the recipient of some of the final product of the composting process, or "black gold." As part of this April's Earth Day activities, employees can volunteer to help plant a rain garden on Center. The first step in this process is to prepare the site, which includes digging the area and adding soil amendments, one of which will be compost from USDA.

For more information on Goddard's composting project, contact Janine Pollack at [Janine.Pollack@nasa.gov](mailto:Janine.Pollack@nasa.gov). ■



Photo Credit: Darlene Squibb

*Caption: During LaunchFest, visitors place biodegradable trash in composting containers.*

## Code 597 Puts Green into Cleaning

By Gary Davis and Michael Wilks

The Propulsion Branch, Code 597, developed a new process that reduces cost and our environmental impact.

In order to build today's sophisticated propulsion systems, certain precautions and procedures must be followed. One of the biggest concerns is particulate contamination. If contaminants are not removed from the system then the system could be degraded or even fail. Particulate contamination could clog a filter or lodge in a thruster valve causing propellant leakage, loss of attitude control, or even loss of mission.

On previous missions, "milk jugs" filled with isopropyl alcohol (IPA) were used to flush flight tubing for internal cleaning of the tubes prior to propulsion subsystem assembly. IPA is a flammable liquid requiring disposal as a hazardous waste.

This cleaning process used several gallons of IPA to clean a single tube. After flushing, a sample of the IPA was tested. If the sample did not pass the required cleanliness levels, the flushing process would be repeated, creating more IPA waste. This method proved costly in time and IPA, priced at an average of \$25 per gallon.



*Caption: Isopropyl alcohol "milk jug" conrainer.*

The Propulsion Group devised and implemented a new cleaning system to eliminate particulate contamination faster, cheaper, and safer than on previous missions, requiring far less IPA. Two Code 597 co-op students, Michael Martin and William Harrod, initially developed the new cleaning system.

The new cleaning system employs deionized (DI) water, instead of IPA, for the bulk of the cleaning process. First, DI water is created, purified, and filtered in a purification system. Next, the DI water is plumbed to a series of two 35 gallon stainless steel tanks.

The tanks are pressurized with nitrogen gas and the DI water is then fed to a cavitation panel.



*Caption: Deionized water tanks.*

The cavitation panel is the heart of the new cleaning system. The panel sends a DI water and nitrogen gas mixture through the article being cleaned. This pressurized mixture of pulsating gas and water agitates the inside of the tube's surfaces, cleaning them effectively and quickly. Following the DI water process, the tube is moved to a class 10K clean room for a final flush of approximately 0.5 liters of filtered IPA. The IPA is sampled and contamination particles are manually counted via microscope, using the same stringent verification methods and requirements as the previous process.



*Caption: Cavitation panel.*

Using the old cleaning process, the Propulsion Branch, during peak activity, generated 546 gallons of IPA waste and recycled 90 gallons of IPA per year. The new DI water process reduced our usage to 77 gallons of IPA per year.

The Propulsion Branch is very proud of our accomplishment and continues to seek innovative methods to reduce cost and eliminate or minimize hazardous waste generation.

If you have any questions regarding this article, please contact, Gary Davis at extension 6-3788 or Michael Wilks at extension 6-2904. ■