

Pollution Prevention Advisor

Vol. 4

August 1994

No. 4

A DEFENSE PROGRAMS PUBLICATION • MONTHLY NEWSLETTER for the NUCLEAR WEAPONS COMPLEX



Sandia National Laboratories' VP of Energy and Environment Dan Hartley, AKA "Captain Planet," shakes hands with a young Earth Day reveler at Kirtland Air Force Base. ("Captain Planet"© Turner Broadcasting System, 1992. All rights reserved.)

'Industries of the Future Initiative' banner unfurled

Once each month at DOE headquarters, Deputy Secretary of Energy Bill White chairs a meeting between most of the Department's assistant secretaries and other movers and shakers—the Pollution Prevention Executive Board. They meet with the purpose of putting DOE in the vanguard of U.S. industrial resource efficiency and pollution prevention. Not a fad, said White at their June 14th meeting, this new DOE strategy is "the way to do business."

At the June 14th meeting, discussion centered on the new direction diagrammed by the Department's 1994 strategic plan, *Fueling a Competitive Economy*, and how it impacts DOE pollution prevention programs. The first of the five newly defined missions profiled in the strategic plan is industrial competitiveness fueled by cost-effectively shifting from waste management to resource efficiency and pollution prevention. In line with this mission, much of the exchange at the meeting dealt with transferring new pollution prevention

See 'FUTURE' on page 7

Pollution prevention an Earth Day gift from DOE

The theme of the day was "Pollution Prevention: Today's Gift for Tomorrow." Captain Planet shook hands with small children. "Auntie Waste" showed the kids her "Treasures from Trash" collection, handicrafts and dry goods made entirely of reused materials, like her purse made from an oatmeal can.

The Federal government reached out to over 3000 people in the Earth Day Festival on April 22nd at Kirtland Air Force Base in Albuquerque. Sponsored by Sandia National Laboratories (SNL), U.S. Department of Energy (DOE), and the U.S. Air

Force along with participation by other Federal, state, and local agencies, the festival featured live cartoon characters, animals (including a graffiti-erasing baboon), food, bluegrass music, and clogging by Sandia and DOE employees.

Reflecting the day's theme were 35 educational displays about protecting and improving the environment, including lively presentations of chlorofluorocarbon elimination, renewable energy, oil recycling, electric vehicles, environmentally safe batteries, and filmless photography. Early arrivals got the chance to take home one of more than 800 tree saplings, mostly elm and oak. The sun, via a

See 'GIFT' on page 7

Inside this Issue

- ◆ Benchmarking team partners with best-in-class to reduce photographic waste 2
- ◆ Mexico and U.S. cooperate on bilingual pollution prevention manuals 2
- ◆ CFC use gets the heat from DOE and EPA 3
- ◆ City of Columbia tests computerized system that charges households for "Solid Waste by the Pound" 5

Benchmarking method reduces DOE liquid photographic waste

By Victoria Levin
Sandia National Laboratories

Brought together by Sandia National Laboratories, a team of personnel from four DOE facilities working with two industry partners has issued the first volume in a series of reports on using benchmarking, a quality assessment tool, to find innovative ways to reduce waste at DOE facilities. Volume 1 of *Using Benchmarking to Minimize Common DOE Waste Streams* details the methods developed by the team during an assessment of the liquid wastes from photographic processes.

Most of the methods were developed in 1993 during a series of workshops in Albuquerque. The liquid photographic waste team was made up of photography technologists and photography lab managers from the Hanford Site, Nevada

Test Site, Pantex Plant, and Sandia National Laboratories/California.

Because of a limited amount of time, the team streamlined and customized the standard twelve steps in the benchmarking process, reaching a consensus on



benchmarking specifically for liquid photographic waste. This involved creating a process flow chart and identifying the metrics, customers and suppliers, and inputs and outputs of the process.

The team developed telephone and written questionnaires and learned on-site interviewing techniques.

From a list of 24 potential industry partners, the benchmarking team chose two, Eastman Kodak Company and the National Aeronautics and Space Administration's Johnson Space Center. The team chose these two partners because both were successful in waste minimization efforts, had diverse operations, and were willing to share information. During interviews and site visits with the two partners, the team identified several approaches to minimizing waste from photographic processes:

- source reduction using squeegees to minimize chemical carry-over between baths; plumbingless mini-labs; and floating lids on chemical containers to reduce evaporation, oxidation, and contamination.
- recycling and recovery of process components using chemical replacement cartridges, electrolytic recovery, precipitation, reverse osmosis, ion exchange, and evaporation.



The Global Perspective

SEDESOL, EPA develop bilingual manuals

Las maquiladoras, the internationally owned factories on both sides of our border with Mexico, will cease to be freewheeling sources of pollution if they follow guidelines of the United States/Mexico Pollution Prevention Work Group, a cooperative between the Mexican Federal environmental agency Secretaria de Desarrollo Social-Instituto Nacional de Ecología (SEDESOL) and the U.S. Environmental Protection Agency (EPA). In February 1992, before the signing of the North American Free Trade Agreement, the Work Group was created based on the La Paz Agreement of 1983, which empowers U.S. and Mexican authorities to act in concert to protect, conserve, and improve the environment of the border region.

One of the Work Group's main purposes is "to help the Mexican government avoid some of the (environmental) issues that the U.S. has faced as (Mexico develops its) industrial base," said Robert Lawrence of EPA's Region 6 office in Dallas, a spokesman for the Work Group.

In the fall of 1993, the Work Group issued the first volume of a set of manuals designed for *las maquiladoras*, a document describing how to prevent pollution from metal-finishing processes, and held a conference on environmentally conscious metal finishing in Juarez, a Mexican border city near El Paso. The Work Group has completed a second manual directed at the region's wood finishers and will hold an associated conference on wood-finishing techniques

to prevent pollution. Later, manuals and conferences in the series will address the growing electronics industry and other industries typical of the border region.

The "big news" about the manuals, according to Lawrence, "is the bilingual information. In the past, the Agency published its documents mainly in English." The Spanish in the pollution prevention manuals is written in a Mexican dialect that reflects the colloquialisms and phrases of the North Border area, he said, enabling workers within a hundred miles of either side of the border to read and understand the manuals in their industrial trades.

Contact Robert Lawrence, EPA Region 6, at 214-665-6580

- regeneration and reuse of solutions such as bleaches, fixing baths, wash waters, developers and stabilizers, and stop baths.

Both Eastman Kodak and Johnson Space Center offered suggestions for best-management practices in systems design, water control, and process control and monitoring.

Team process experts examined the photographic processes of the other DOE sites. One photo technologist said that he had worked in DOE photography for 21

years and the project was his first chance for formal interaction with his peers. "I now have contacts with three other DOE labs, which I can use to improve our daily conduct of operations and to help me cope with whatever new environmental regulations come my way," the technologist said.

Volume 1 of *Using Benchmarking to Minimize Common DOE Waste Streams*, is a publication of the Benchmarking for Waste Minimization Project, sponsored by DOE's Waste Minimization Division (EM-352). Volume 1 contains training

guides for the development of questionnaires and on-site interviews and includes an extensive list of resources for waste minimization and photographic waste management. Volume 2, a report by a team focusing on waste motor oil at DOE facilities, will be released later this year. Four other waste streams are targeted for benchmarking in the near future: construction debris, office waste (excluding white paper), plating shop wastes, and machine shop wastes. ♻️

Contact Victoria Levin at 505-844-8956.



Photo Courtesy John Hartley

One of three 1350-ton chilled-water compressors, this massive compressor supplies cool water for comfort and some process cooling for 12 buildings at the Savannah River Site. These chillers will be replaced because of their high leak rate of an ozone-depleting CFC. The replacement project is expected to be completed in 1996.

DOE replaces CFC chillers

According to the DOE In-House Energy Management (IHEM) program, DOE sites should be aggressively pursuing high-efficiency non-CFC chiller replacement based on the economic lifetime of the existing chiller and other factors.

IHEM is currently funding replacement of existing CFC chillers with high-efficiency, CFC-free chillers. For Fiscal Year 1995, retrofit and replacement funds are available for projects that meet current IHEM criteria. Most chiller replacement and retrofit projects should qualify based on the energy savings alone, with the additional benefits of reduced ozone depletion and maintenance savings.

If the energy-demand savings from a proposed replacement or retrofit support a simple payback of 10 years or less and a savings-to-investment ratio greater than 1.0 (including avoiding the cost of replacing chillers with more than five years of useful life remaining), IHEM will fund the chiller project.

A chiller changeout program should also be integrated with measures to reduce cooling loads such as replacing hot lighting and installing window-film. IHEM encourages such integrated projects because the reduced cooling loads not only increase energy savings but also lower the investment in chiller replacement.

In April, Defense Programs began to prioritize CFC chiller units and other refrigerant equipment throughout the DP complex for replacement and retrofitting.

EPA warns CFC users to plan, retool

The Environmental Protection Agency (EPA) issued a reminder to users of chlorofluorocarbons (CFCs) that the deadline for ending the production of all CFCs is December 31, 1995—less than 18 months from now. A bulletin issued in March (EPA 430-N-94-004, "Countdown to CFC Phaseout") lists five assumptions that a CFC user should not and cannot count on: (1) CFC supply will still be plentiful after 1995; (2) a magical drop-in alternative will soon appear; (3) EPA will change its regulations; (4) CFC use will be granted a special exemption; (5) other CFC users will act, so the user is not required to do anything.

Centrifugal chillers, used to cool large buildings, are a major source of demand for CFCs. In 1992, approximately 15 million pounds of CFC refrigerant were sold to service some 80,000 of these chillers. Centrifugal air-conditioning units account for most of the CFCs used by DOE.

In November 1993, EPA Administrator Carol Browner signed the final Accelerated Phaseout Rule that established the 1995 deadline for phasing out the production of CFCs. EPA strongly recommends that industrial CFC users immediately develop and implement a refrigerant management plan to comply with the requirements of the phaseout rule. ♻️

Grand Junction reduces emissions

The DOE Grand Junction Projects Office (GJPO) has begun to replace its lighting with more energy-efficient lighting. Sixty-seven hundred square feet of office space out of a total of 218,000 square feet received new lighting. The new lighting systems saved GJPO 43 percent in lighting costs for that space and used 28,524 fewer kilowatt hours per year than the old systems. The new lights have also eliminated more than 62,700 pounds of carbon dioxide that would have been emitted from the generation of the nearly 30,000 kilowatt hours of electricity saved.

The Environmental Protection Agency (EPA) "Green Lights" is a voluntary, non-regulatory program that encourages U.S. businesses to install energy-efficient lighting, reducing national electricity demand and preventing air pollution that contributes to acid rain. RUST Geotech, operating contractor for GJPO, became an EPA "Green Lights" Partner in 1992 and, with DOE support, has made steady progress in recycling, waste minimization and pollution prevention. ♻️

President orders change in energy use, landscaping practices

In March, President Clinton issued an Executive Order that requires Federal agencies to make major changes in energy and water use over the next 10 years. In a separate memorandum issued April 28th, the President directed similar changes in Federal landscaping methods.

Executive Order 12902 calls for each Federal agency to immediately survey its facilities to determine the order in which the facilities will be audited to evaluate their energy and water use. Six months after its audit is complete, each facility must begin to implement the recommen-

Check out the potential savings in your area

You can use the following formulas and factors to calculate the amount of emissions from electric power generation that can be eliminated annually in your region by reducing power consumption. These savings can be achieved, for example, through upgrades to more efficient lighting such as those suggested in the EPA "Green Lights Memorandum of Understanding."

- Carbon dioxide (CO₂)**
kWh/yr saved x factor = pounds/yr
- Sulfur dioxide (SO₂)**
kWh/yr saved x factor = grams/yr
- Nitrogen oxides (NO_x)**
kWh/yr saved x factor = grams/yr

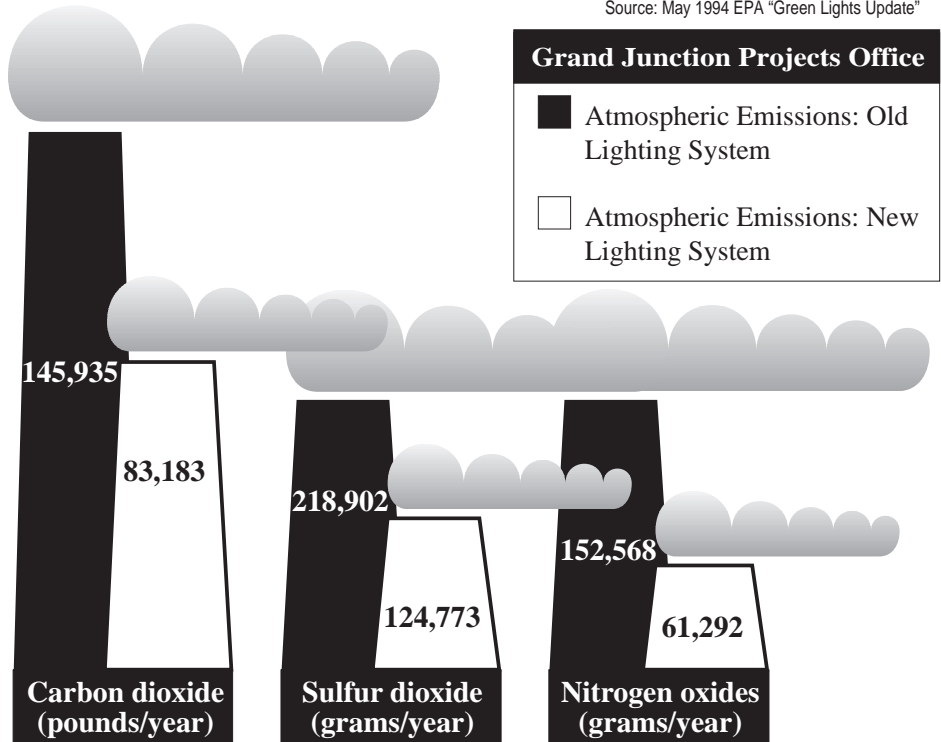
Note: The calculations of savings for the GJPO are based on the assumption the cost savings and kWh usage are directly proportional. Traditional billing practices for energy usage could indicate an even greater emissions savings from installing new lighting systems.—Ed.

Emission Factors by EPA Region

EPA Region	Emission Factors		
	CO ₂	SO ₂	NO _x
Region 1: CT, MA, ME, NH, RI, VT	1.1	4.0	1.4
Region 2: NJ, NY, PR, VI	1.1	3.4	1.3
Region 3: DC, DE, MD, PA, VA, WV	1.6	8.2	2.6
Region 4: AL, FL, GA, KY, MS, NC, SC, TN	1.5	6.9	2.5
Region 5: IL, IN, MI, MN, OH, WI	1.8	10.4	36.5
Region 6: AR, LA, NM, OK, TX	1.7	2.2	2.5
Region 7: IA, KS, MO, NE	2.0	8.5	3.9
Region 8: CO, MT, ND, SD, UT, WY	2.2	3.3	3.2
Region 9: AZ, CA, HI, NV, Guam, Am Samoa	1.0	1.1	1.5
Region 10: AK, ID, OR, WA	0.1	0.5	0.3

Note: State pollution emission factors are aggregated by EPA region. Factors for U.S. territories are national average emission factors.

Source: May 1994 EPA "Green Lights Update"



DOE's Grand Junction Projects Office in Colorado reduced atmospheric emissions from electric power production in EPA Region 8 by installing new energy-efficient lighting in 6700 square feet of office space.

dations of the audit for the installation of energy technologies that are renewable and efficient and that conserve water.

The President ordered each Federal agency to:

- reduce overall energy use in its buildings by 30 percent from 1985 levels by the year 2005;
- increase overall energy efficiency in its industrial facilities by 20 percent from 1990 levels by 2005;
- minimize the use of petroleum products by switching to alternative energy sources;
- significantly increase the use of solar and renewable energy sources;
- designate one major building as a showcase of energy or water-use efficiency;
- design and construct new facilities to minimize their life-cycle cost through energy-efficient and water-conservation technologies, using solar technologies where cost-effective.

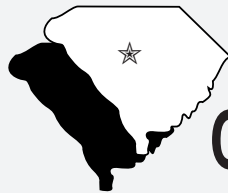
In the White House memorandum of April 28, President Clinton directed Federal agencies to adopt environmentally and economically beneficial landscaping practices at Federal facilities and federally funded projects. According to the memorandum, environmentally beneficial landscaping means using regionally native plants and employing landscaping practices and technologies that conserve water and prevent pollution.

The President further directed the agencies to reduce fertilizer and pesticide use, recycle green waste, and minimize runoff. Planting regionally native shade trees around buildings to reduce air conditioning demands is an innovative measure to meet the goal to reduce energy consumption established in Executive Order 12902, the President said in the memorandum.

By April 1995, an interagency working group will develop and issue guidance to Federal agencies for meeting these directives. By February 1996, all Federal agencies must incorporate the President's directives into their landscaping programs and practices. ♻️



A City of Columbia worker stands by as the city's new computerized system weighs the garbage collected from a residential curb. By processing the data from the truck's mechanical arm, the onboard computer determines the charge per household for disposal of household waste.



Local Color City charges by the pound

Columbia, South Carolina, is the site for testing a computerized system that weighs each curbside roll cart of household garbage as it goes into the collection truck. The household is then charged a mock disposal fee based on the weight of the garbage. The City of Columbia has labeled the program the Municipal Solid Waste by the Pound program.

During the test, five hundred roll carts in socially diverse neighborhoods were tagged. The radio frequency identification tags identify each household to an onboard computer in the garbage truck. A tag reader, built into a weight scale and dumper mechanism on the truck, records the number of pounds of waste collected from each household. The onboard computer captures the data, which is downloaded at the end of each day to the computer at the city's Solid Waste Division office.

Each month, test households receive a dummy bill with the amount of garbage collected every week and a total cost for its disposal, plus a weight history for up to twelve previous months. The disposal

rate on the dummy bill is 25 cents per pound, added to the standard monthly garbage pick-up charge of \$2.50. The city's Solid Waste Division is evaluating the program for possible city-wide implementation. However, the cost per pound may change if the program is implemented.

According to Robert Anderson of the city's Solid Waste Division, charging households by the pound for waste disposal could increase his customers' participation in recycling and appreciation of source reduction.

The Columbia experimental program is a partnership between the municipal government and the manufacturer of the onboard scale and computer system on the city garbage trucks, called Smart Way II™. Columbia was chosen as the test city for Class III certification of the weight system, which is issued by the National Institute of Standards and Technology.

Contact Robert Anderson, Superintendent, City of Columbia Solid Waste Division, at 803-733-8456.

DOE demonstrates three priority technologies for treating mixed wastes

Sponsored by the Office of Technology Development (EM-50) and coordinated by Oak Ridge National Laboratory, DOE's Mixed Waste Integrated Program (MWIP) in partnership with private industry and university research is expediting the development of a suite of technologies to process the over 1.2 million cubic meters of mixed low-level and mixed transuranic wastes that will be managed by DOE over the next five years.

MWIP is currently demonstrating three technologies that will process actual mixed wastes: the fixed-hearth plasma arc furnace, vitrification, and the catalytic extraction process.

Designed to accept unopened and unsorted drums of wastes, the fixed-hearth plasma arc furnace recently underwent a series of six tests by an MWIP contractor in California using three simulated waste types. An organic sludge, an inorganic sludge, and a heterogeneous mix of combustible debris (wood, paper, rubber, and steel) were mixed with hazardous and surrogate radioactive components to simulate wastes typical at DOE sites.

While in the fixed-hearth furnace, all test materials were converted to a dense, vitrified monolith that has tested favorably for leaching. Off-gas samples were taken and analyzed. Off-gas systems capture particulates, destroy the products of incomplete combustion, and abate nitrogen oxides from high-temperature processing.

These systems are being improved and developed under MWIP. The off-gas initiative includes developing continuous emission monitors and systems designed to capture mercury and other airborne components. MWIP off-gas researchers have also evaluated cleanable high-particulate air filters.

The series of tests by the California contractor generated valuable data that will be used to evaluate the fixed-hearth

process for treating DOE mixed wastes. Test data will also support the process of obtaining permits for the technology and will be used in safety assessments for the fixed-hearth furnace.

Other contractors are helping construct a pilot-scale system using the baseline data from the test series, and a field-scale system will be demonstrated by Fiscal Year 1996.

Tests of the fixed-hearth furnace using actual mixed wastes will take place at Argonne National Laboratory-West. The plasma-arc technology is being developed by Idaho National Engineering Laboratory through contracts with industrial firms.

MWIP is also demonstrating vitrification as an alternative to grouting to stabilize mixed low-level sludges. In December 1993 at Clemson University, MWIP researchers and contractors tested a pilot-scale vitrifier using a feed of surrogate incinerator ash.

Additional tests have been conducted using surrogate waste water sludges. Tests of actual waste streams processed in a pilot-scale, joule-heated ceramic melter are scheduled for this fiscal year. In Fiscal Year 1995, MWIP will demon-

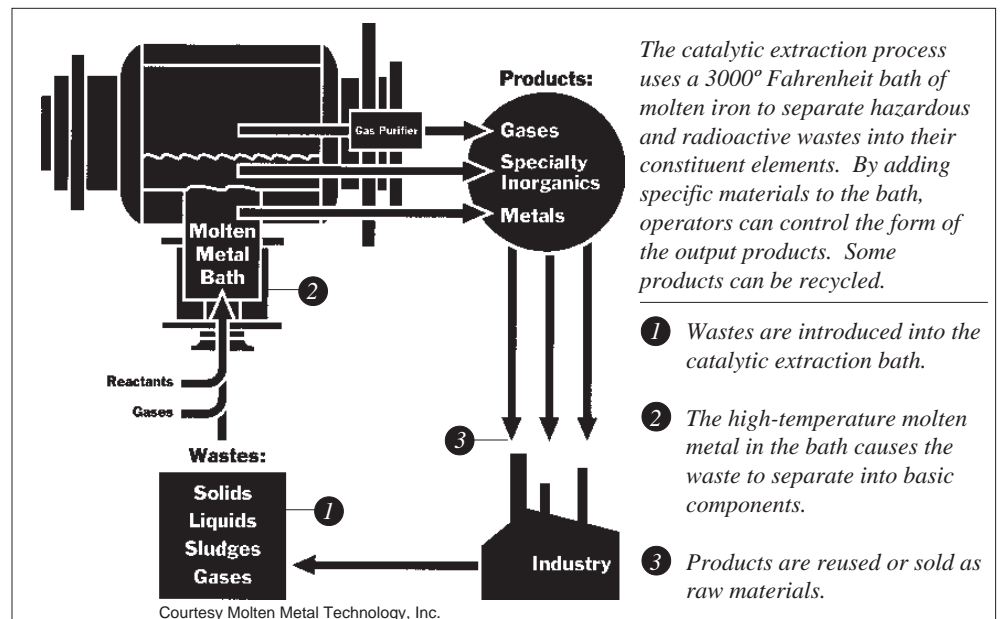
strate a mobile melter at Oak Ridge using actual sludge and incinerator ash.

The catalytic extraction process is a commercial technology developed from steelmaking. The core of the process is a reactor tank that holds a bath of molten iron (about 3000 degrees Fahrenheit) containing catalytic chemicals. When wastes are added, the chemical bonds between the constituent elements of the waste are broken. For example, radioactive compounds are reduced to their elemental forms; polyvinyl chloride is reduced to hydrogen, chlorine, and carbon; and sludges are reduced to hydrogen gas, ceramics, and metals.

The addition of specific elements to the molten metal bath can create products such as steel or hydrogen chloride, which can be separated from the melt and packaged or reused. Radioactive isotopes can be stabilized in a ceramic product suitable for final disposal.

Contractors are now conducting demonstrations of the molten metal technology in the Oak Ridge area using ion exchange resins, while demonstrations using surrogate wastes continue under a Program Research and Development Agreement between DOE and commercial developers. ♻️

Contact Paul Hart, MWIP Program Manager, at 301-903-7456 or Jan Berry, MWIP Coordinator, at 615-574-6907.



GREEN Contest yields good 'ROI' at Pantex

From May 25th to July 1st, the Pantex Plant in Amarillo, Texas, inspired employees to submit ideas for pollution prevention and waste minimization through a GREEN Contest—Globally Reduce Environmental Emissions Now. After posting the contest rules on available bulletin boards, members of the Pollution Prevention/

Waste Minimization Section at Pantex attended every stand-up meeting they could find to alert workers that July 1st was the due date for their suggestions. They also encouraged contestants to work in groups.

The employee response to the GREEN Contest was greater than expected, according to Jim Luginbyhl, section manager of the Pollution Prevention/Waste Minimization Section. Engraved plaques will be awarded to every contes-

tant who submits an idea selected for implementation. "Overall, the effect of the GREEN Contest has been superb. . . and it keeps them thinking about their waste streams," said one GREEN Contest organizer. ♻️

Contact Tamara Criste at 806-477-4796.

GIFT

photovoltaics trailer supplied by SNL, beamed electric power for the live music and public address system.

The Sandia celebration was their first Earth Day event, according to Ken Hanks, one of several Sandians on the planning committee. "1995 is the 25th anniversary of Earth Day," Hanks noted, looking ahead, "and it should be celebrated everywhere." He added that the committee's organization of the festival was well-documented and that Sandia was eager to share its success with other DOE facilities.

The Savannah River Site (SRS) celebrated Earth Day differently from past years, going beyond the traditional campaign for environmental awareness with the theme "You Can Make a World of Difference." During the week before Earth Day, SRS solicited suggestions for pollution prevention and waste minimization from all employees, then held six brainstorming sessions on April 22nd where SRS workers generated ideas that can be implemented at SRS. Over 1100 ideas for pollution prevention and waste minimization came out of the week's campaign.

The Earth Day Committee and the SRS Waste Minimization Group categorized the ideas and assessed their feasibility. Everyone who offered a suggestion was recognized with a certificate of participation and given a reusable plastic cup and magnet with the SRS Earth Day logo. The submitters of the top 50 suggestions were awarded more prizes during July. The most frequent suggestions were to reduce styrofoam cup usage and to cut

down on paperwork in administrative activities as a means of source reduction.

The Waste Minimization Group will track implementation of the workers' ideas. The current plans are to implement the easy-to-do ideas as soon as possible and hold a post-Earth Day campaign to share the suggestion program's successes with all SRS employees.

Also in conjunction with Earth Day, over 1500 workers at the Y-12 Plant participated in month-long activities sponsored by the site's Pollution Prevention Program Office to educate Y-12 employees in general environmental awareness and pollution prevention. Several of the awareness activities focused on environmentally responsible purchases at work and home.

Y-12's pollution prevention office sponsored technical forums for plant workers that emphasized the responsibility to recycle and to buy products made from recycled materials. The office also provided employees with printed information on how to incorporate these activities into their daily lives. Interactive games ("Wheel of Trivia," "Aluminum Toss," and "Ring-A-Plastic") quizzed the workers on their affirmative-procurement knowledge, emphasized the use of recycling bins, and demonstrated how to identify products that can be recycled locally. ♻️

At Sandia, contact Robyn Davis at 505-848-0969 or Ken Hanks at 505-845-9370; at Savannah River, contact John Harley at 803-557-6332; at Y-12, contact Sheila Poligone at 615-241-2568.

FUTURE

technologies from DOE programs to U.S. private industry.

A flagship technology transfer project, The Industries of the Future Initiative (IFI) was presented to the board by John Atcheson (EE-20). The IFI will begin by helping develop pollution prevention technologies for the petroleum refining industry in the areas of computer control and monitoring, catalysis by design, and separation and combustion sciences.

According to Atcheson, by expanding the initiative to include the chemical, aluminum, steel, pulp-and-paper, metal-casting, and glass industries, DOE will "develop pollution prevention technologies into an investment portfolio . . . that responds to (U.S.) industry needs."

Atcheson said that while consulting the refining industry on the project, DOE will work with EPA to "rationalize" regulatory and technology policies for the industries targeted by the IFI. He said that the initiative will work to create a favorable regulatory climate that includes:

- regulation of whole facilities, not just pipes;
- simultaneous protection of all environmental media as opposed to one at a time;
- integration of environmental and economic objectives through pollution prevention;
- administrative flexibility and agility;
- concurrent regulatory, fiscal, and technology policies; and
- involving all stakeholders in the process.

According to Atcheson, the template fabricated by the IFI for the refining industry will be used to develop innovative technologies and policies for the other target industries. ♻️

Los Alamos plans to reduce waste water

By Linda A. Anderson
Los Alamos National Laboratory

Plans to reduce waste water from 12 million to 130,000 gallons per year recently brought praise to Los Alamos National Laboratory. In July, Herman C. Ledoux, Deputy Area Manager of DOE's Los Alamos Area Office, commended the laboratory for efforts to both reduce the amount of waste water generated by high-explosives operations and develop innovative technologies for treating waste water.

According to Ed Hyde, staff member with Engineering and Information Resources, Los Alamos plans to reduce water use by treating and recycling waste water and by decreasing the number of applications that use water. Plans also include the construction of a new facility

to consolidate treatment of the laboratory's waste water, which contains small amounts of high-explosive waste and solvents. The number of discharge sites will be reduced from 21 to one.

The Chemical Science and Technology and Dynamic Experimentation Divisions continue to research methods for treatment of waste water. These include

biological technologies and evaporation processes.

The facilities are still in the design phase, but the system should be up and running in Fiscal Year 1997, said Hyde. Congress has already approved funding for the project. ♻️

Contact Ed Hyde at 505-667-3578.

Moving? Corrections?

Please print your new address below.

Name _____
 Job Title _____
 Organization _____
 Address _____
 City _____
 State _____ Zip Code _____
 Phone _____ Fax _____

Clip this form and the old address label and send to:

McPherson Environmental Resources
 109 South Riverside Drive
 Elizabethton, Tennessee 37643
 or fax to: 615-543-4382

The *Pollution Prevention Advisor* is published by the U.S. Department of Energy, Office of Defense Programs. For subscription information, please contact the Editor. All other inquiries concerning information in the articles should be addressed to the individual contributors.



The *Pollution Prevention Advisor* is printed on 100% Recycled Paper with Soy-Based Ink.

McPherson Environmental Resources
 109 South Riverside Drive
 Elizabethton, TN 37643
 Phone: 615-543-5422
 FAX: 615-543-4382

DOE Program Manager: John A. Marchetti
 Editor: Elizabeth McPherson
 Managing Editor: John R. Webb
 Layout Designer and Technical Editor: Bradford R. Connatser
 Word Processor: Becky Baskin
 Mailing List: Judy Hockenbery
 Printing and Distribution: U.S. Department of Energy

This publication is produced by Systematic Management Services, Inc. (SMS), for the U.S. Department of Energy under contract DE-AC01-93DP00249. While reasonable efforts are made to ensure the accuracy of the information in *Pollution Prevention Advisor*, SMS does not guarantee such accuracy and shall not be held liable for any consequences arising out of the use of information published in *Pollution Prevention Advisor*. The mention of products, service or associations in the publication does not constitute an endorsement. The views expressed are not necessarily those of the Editors, SMS, Office of Defense Programs, the U.S. Department of Energy, or the United States Government.

**United States
 Department of Energy (DP-34)
 Washington, D.C. 20585**

Official Business
 Penalty for Private Use, \$300

FIRST-CLASS MAIL
 POSTAGE & FEES PAID
 U.S. DEPT. OF ENERGY
 Permit G20

FIRST CLASS MAIL