U.S. DOE Office of Defense Programs

ESAVE

Environmental Stewardship & Value Engineering

Quarterly Newsletter for the Nuclear Weapons Complex

Los Alamos lauds 200 P2 heroes at Earth Day awards celebration

Los Alamos National Laboratory's (LANL) April 27th observance of Earth Day 2000 was essentially a standing salute to the numerous P2 heroes at that facility. In a formal ceremony, awards were presented to designers, planners, and implementers of 33 pollution prevention projects which have significantly reduced the amount of waste disposed of by the laboratory. All in all, nearly 200 individuals representing a broad spectrum of programs and defined by various professional and technical backgrounds were recognized for their inspired and creative P2 efforts.

Jay Edmonson of Lawrence Berkeley National Laboratory (LBNL) drills steel plates from a decommissioned particle accelerator, the Bevatron, in Building 51 at LBNL. Los Alamos National Laboratory is receiving about 300 tons of the steel plates, formerly used as magnet yokes, from LBNL. The plates will be used as shielding for LANL's new Spectrometer for Materials Research at Temperatures and Stress (SMARTS). LANL recently received 23 tons of the LBNL steel, and will save about $280,000 on the purchase of the first 55 tons of the new shielding. LBNL will save approximately $1 million in disposal costs for 300 tons of Bevatron steel.

Tom Starke, program manager of LANL's Environmental Stewardship Office, welcomed an auditorium full of P2 award winners and their work associates and reminded attendees that pollution prevention not only produces environmental benefits but also increases safety and minimizes regulation. He then introduced Secretary of the New Mexico Environment Department Peter Maggiore, who is credited with the creation of New Mexico's Green

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Argonne-tested corn/soy blend cleans better than harmful solvents

A product derived from corn and soybeans may clean up parts-cleaning operations, and be healthier for machinists and the environment. Researchers at the Department of Energy's (DOE) Argonne National Laboratory-East have recently developed, tested, and licensed a non-toxic, agriculturally derived solvent technology.

Most of the hydrocarbon-based, halogenated, and chlorinated solvents commonly used in machine shops for cleaning and degreasing applications face strict environmental and toxicological restrictions for their use, handling, and disposal. Argonne-East researchers realized that a non-hazardous alternative solvent could be both cost-effective and environmentally appropriate, so they began tests, partnering with scientists at Vertec Biosolvents LLC of nearby Mt. Prospect, Ill.

Machinists in the Central Shops at Argonne National Laboratory-East gave a unanimous "thumbs-up" in tests of an Argonne-developed solvent made from corn and soybeans, which proved to clean and degrease metal parts better than petrochemical-based solvents.

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Zia Program, used by LANL and many New Mexico companies to promote P2 awareness, encourage everyone in an organization to become environmental stewards, and recognize successes in that area.

Maggiore congratulated the LANL P2 award winners and New Mexican citizens in general for their environmental stewardship at the Federal and state levels. He speculated that we could be at crossroads nationally, the challenge being to retain the gains we've made and continue to make progress. Maggiore thanked LANL for contributions to the Green Zia Program, including providing interns to assist the state and incorporating Green Zia into its own programs. Expressing his appreciation for Patricia Gallagher of his staff, a champion of the state's pollution prevention efforts, Maggiore noted that the Green Zia Program had thus far granted 22 recognition awards and that the state had realized $42 million in savings through its P2 programs. He announced that New Mexico Gov. Gary Johnson mentioned the awards program in his latest State of the State Address and confirmed that environmental programs are achieving more and more visibility throughout New Mexico.

One step in the preparation of purified plutonium metal involves using magnesia crucibles to form metal ingots. The crucible becomes waste, but must be processed further before being discarded, creating even more waste. At Los Alamos National Laboratory, modification of the casting process allows crucibles from up to five casting runs, such as the fragments shown here, to be consolidated and discarded as one item instead of five, creating an 80-percent savings in plastic packaging waste from "bagging out" the crucible fragments and an 80-percent reduction in non-destructive assay requirements, as well as reduced radiation exposure to workers.

Department of Energy Office of Defense Programs' John Marchetti then delivered an impassioned speech addressing how much more there is to do in the realm of environmental stewardship. Recounting the recent spill of 111,000 gallons of oil into Maryland's Patuxent River, Marchetti stressed that the company responsible for the spill as well as the community in which it happened had pulled together to minimize the resulting damage. The company had systems in place which enabled it to respond immediately, and the community was quick to take measures to mitigate results of the spill. The point, said Marchetti, is that "people, organizations, and countries will act when the action is in their own self-interest." He went on to add that people need the facts, incentives, and motivation. After congratulating the LANL award winners for their leadership, Marchetti encouraged each of them to set higher goals and to set examples for others to follow. "With motivation and perseverance," he concluded, "no one can stop you from succeeding!"

Starke, assisted by Maggiore, then launched a tribute to the P2 projects that have kept tons of LANL waste out of landfills and other treatment or disposal facilities, describing each project, crediting each participant, and noting that most of the projects show cost savings to the lab and ultimately to DOE.

Some of the award-winning P2 projects resulted from research and development which, applied on a wholesale level, will make older, wasteful, and often dangerous processes obsolete—for example, a patented lab technology that removes buildup in perchloric acid fume scrubbers. Other examples of projects that were direct results of LANL R&D were Thermally Induced Gallium Removal, Decontamination of Accelerator Cooling Systems, Dry Machining of Plutonium Hemi Shells, and Plywood Substitution.

Projects which involved modifying existing processes were also cited, including TA-16-260 H.E. Oil Reduction, TCE Mechanical Spray Washer, Reusable Shielding Block, Otowi Green Zia Pilot Project, Reduction of TRU Caustic Waste from Plutonium Recovery, Upgrade of Argon Gas Flow System, ESA Machine Coolant, Pu-238 Residue Solidification Process, JCNNM Heavy Equipment Shop Hot Water Parts Washer, and Decontamination of Accelerator Cooling Systems.

Other projects involved modified procedures, such as the TA-48 RC45 Clean Chemistry/Mass Spectrometry "Green Is Clean" Program Implementation, Aerosol Cans From RCAs Processed as Recycled Metal, MLLW Leaded Casks Used for Source Burial as LLW, Anode Casting Reduction, HEWTF Waste and Contaminant Reduction, Stormwater Pollution Prevention Plan Development, Pu-238 Waste Solution Volume Minimization, and Elimination of Returned Samples Reduced, Recycled, and Reused at MA-P.

Many of the winning projects were creative initiatives responding to persistent challenges: SIGMA Mesa Clean-Up & Recycling, Reuse of Lead Slabs for Shielding, TA-53 Avoided MLLW, Metals Processed as Recycled Metals, Avoided MLLW Through Segregation and Reclassification, Asphalt Recycling, SMARTS: Berkeley Steel Reuse, Fiber Optic Distribution, TA-53 P2 and Waste Minimization, Stripping of Lead Shielding from Gloveboxes, and Oil Recycling Staging Area for DX Division.

All in all, nearly 200 individuals received well-deserved credit for these improvements in operations at LANL. According to LANL's Tom Nolen, the ceremony focused on workers who are there where the "rubber meets the road."

Contact Tom Starke, 505-667-6639 or tps@lanl.gov

How to help out at Los Alamos

Many people within DOE have asked what they might do, individually, to assist and support recovery efforts at Los Alamos. Information about what you can do can be found at http://www.doe.gov/lanl.htm

—Mary Dixon, acting for Jonathan Ventura, Executive Assistant, National Nuclear Security Administration, Office of the Deputy Administrator for Defense Programs

I am looking for guidance to share with my agency to be sure to include pollution prevention in the Los Alamos area cleanup plans and hopefully reduce further harm to the environment. Any help is greatly appreciated.

—Pat Gallagher, New Mexico Environment Department, 505-827-0677 or pat_gallagher@nmenv.state.nm.us

From 'Argonne-tested' on page 1

Lactate esters have long been known to have very good cleaning and solvating properties. One of these, ethyl lactate, is also non-toxic—it is FDA approved for food flavor and animal feed use—and is completely biodegradable, easily recoverable, and made from corn and other renewable carbohydrate crops. But because of its price and limited availability, use of ethyl lactate has historically been limited to specialized cleaning applications, particularly in the electronics industry.

"Argonne's researchers have developed a patented process for commercially producing ethyl lactate that is more economical," said Argonne-East Pollution Prevention Coordinator Keith Trychta. "The reduced cost of producing ethyl lactate and its effective solvent characteristics hopefully will create a market demand."

In a pilot study conducted in 1999, a pure ethyl lactate solvent called Vertec™ was evaluated for machine shop parts cleaning at the Argonne-East Central Shops, and was found to be very effective. But pure ethyl lactate has a flash point of 139 deg F, one degree lower than the regulatory limit for flammability in storage and handling. Another problem is ethyl lactate's characteristic odor, which is easily detected (at around 2 ppm), even though the solvent is benign and safe.

Vertec scientists meanwhile discovered that blending ethyl lactate with commonly available soy methyl ester (methyl soyate) enhanced the properties of both—the flash point of the blended solvent is over 140 deg F and the odor level is considerably reduced, while the blend retains most of the solvating power of pure ethyl lactate. A 50:50 blend of the two, Vertec Gold 50™ is a biodegradable, non-toxic solvent derived from two of the major crops in the U.S. and around the world—corn and soybeans.

But there was no information available in the open literature on the performance of such a blend for general cleaning and degreasing applications in a full-fledged machine shop. Argonne-East researchers conducted a second-phase pilot study in the lab's Central Shops to (1) compare the corn/soy solvent's performance to the petrochemical products currently in use and (2) to determine the recoverability of reusable ethyl lactate from the spent solvent.

Argonne-East machinists switched to the blended biodegradable solvent in their regular daily cleaning operations for 10 weeks, using machines provided especially for the comparison by Safety-Kleen, the lab's parts-cleaning contractor. They found that the blended biodegradable solvent required less time to work and yet was more effective in cleaning parts, especially large and extremely dirty parts. It required no new or special procedures to work with or manage, but it did require more time to dry. Another desirable feature: the corn/soy solvent loosened and helped remove old epoxy paint, carbon deposits, fused gaskets, and other difficult materials from old machine parts and covers.

According to an analysis performed on the job by an Argonne-East industrial hygienist, the blended solvent could be safely used unventilated; however, its odor was more noticeable than those of the petrochemical solvents. Some of the machinists found the corn/soy product's odor to be similar or more pleasant, but most found it to be less pleasant.

Despite the slower drying rate and more detectable odor, the machinists unanimously agreed that, because of its effectiveness in cleaning, they would prefer to use the agricultural blend over petrochemical solvents.

Distillation tests of the spent corn/soy solvent to establish the recyclability of the ethyl lactate from the blend showed very high recovery—more than 95 percent, with a purity matching the original ethyl lactate that is used to make the blend. A combination of low reflux ratio and heat of vaporization makes the distillation of the blend very energy efficient and economical—less than 1¢ per pound to recover the ethyl lactate. The used methyl soyate fraction of the blend can be disposed of according to established methods, such as use as fuel in cement kilns.

Results of the Argonne-East study show that the ethyl lactate/methyl soyate solvent is a superior, high-performance product for cleaning and degreasing applications, while environmentally benign and potentially very economical. The Argonne-East researchers highly recommend its continued use in the lab's Central Shops and tout it for all parts-cleaning contractors such as Safety-Kleen as well as for Federal, state, and municipal organizations. Vertec has entered into a marketing agreement with a major agricultural products company, and solvent blends containing ethyl lactate are now available in tank car quantities at a reasonable price, making them readily available and affordable for wider applications.

Contact Keith Trychta, Argonne-East, 630-252-1476 or ktrychta@anl.gov

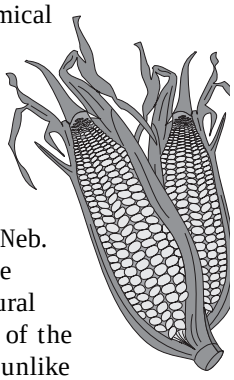
Skimmer, Evaporator = Zero Waste

Fred Algarra, of LANL's machine shops, writes of a successful P2 project recognized at the recent Earth Day awards there: "Within the last few months, we have completed the installation of the evaporator unit which was part of the skimmer project to recycle spent machine tool coolant (see 1st Quarter 1998 *Pollution Prevention Advisor*). Since the installation and operation of the evaporator for spent coolant from our machine tools, we have successfully processed 50 drums, a total of 2,750 gallons. The byproduct or 'remains' from the spent coolant amounts to 275 gallons of recyclable oil, which is sent to Albuquerque for recycling. The savings on this project totaled $50,000 through the end of April. The utilization of the evaporator and the recycle system amounts to zero waste."

Contact Fred Algarra, 505-667-2041 or algarra@lanl.gov

Corn-based plastic invented

A type of plastic created from corn and wheat has been produced by a research project between Dow Chemical and grain processor Cargill.



The result of the collaboration—polyactide (PLA), brand-named NatureWorks™—may be applicable in carpet-making, packaging, clothing and other products. *Architecture* magazine reported in March that the partners are building a manufacturing facility in Blair, Neb. expected to produce 300 million pounds of the material annually. Making plastic from a natural source frees its production from the volatility of the crude oil market. Another advantage is that, unlike petroleum-based plastics, PLA is made entirely from renewable resources and is biodegradable.

Energy, Interior partnership creates '*Amsinckia grandiflora* Reserve' at LLNL

Preservation of a unique ecosystem that will provide a home to more than 300 species of plants and 95 species of mammals, birds, reptiles and amphibians has been achieved through an agreement announced April 28, 2000 by Secretary of Energy Bill Richardson. The agreement with the U.S. Fish and Wildlife Service designates 160 acres within the Department of Energy's (DOE) Lawrence Livermore National Laboratory (LLNL) Site 300 Experimental Test Facility as the *Amsinckia grandiflora* Reserve. The *Amsinckia grandiflora* is an endangered floral species commonly known as the large-flowered fiddleneck.

Amsinckia grandiflora, *or large-flowered fiddleneck.*

"Just as Livermore National Laboratory helped write the nation's history in times of tension and conflict, it is today improving the health of our environment and leaving a positive legacy for the future," said Secretary Richardson. "This site is among many that the Energy Department and the country are reclaiming from national defense purposes."

This is the latest example of DOE's commitment to protect the environmental assets of its sites. Over 178,000 acres of unique wild lands have been preserved by the Energy Department because of their natural significance. The Reserve provides critical habitat for more than 300 species of plants and 95 species of mammals, birds, reptiles and amphibians. Plants in the Reserve that will be protected include a portion of increasingly important native grasses. Part of the Reserve also provides potential habitat for the endangered valley elderberry longhorn beetle. The Reserve supports the threatened California red-legged frog, and may contain potential habitat for threatened species such as the Alameda whipsnake.

As described in the memorandum of agreement, as the landowner, the Energy Department will manage the environmental compliance, safety, health, fire protection, access, and cleanup activities, while limiting the future programmatic use of the area. The U.S. Fish and Wildlife Service will manage the recovery efforts for the endangered *Amsinckia grandiflora* resources within the area, and provide expertise and technical advice to DOE for the Reserve's ecological management.

Contact Tom Welch, DOE HQ, 202-586-5806 or John Belluardo, DOE Oakland Area Office, 510-637-1818

DOE transfers management of lands to state, Federal agencies

The Department of Energy (DOE) holds 2.4 million acres of land, much of which has been used as buffer zones that separate DOE activities from nearby communities. Recognizing that its land holdings are ecologically significant; contain threatened, endangered or rare species; or are unique in flora, fauna, vegetation and habitat, DOE has signed agreements to co-manage these parcels with Federal and state agencies. As a result, over 178,000 acres of unique wild lands have been preserved because of their natural significance.

Hanford Reach - Hanford Site, Wash.

At the Hanford Site in Washington, 90,000 acres of shrub-steppe habitat along the Columbia River was preserved on April 10, 1999. The "Wahluke Slope" is now managed by the U.S. Fish and Wildlife Service (USFWS) as a National Wildlife Refuge. This land had served as a safety and security buffer zone for Hanford operations since the inception of the Manhattan Project in 1943, resulting in an ecosystem that has been relatively untouched for decades.

Rock Creek Reserve - Rocky Flats Environmental Technology Site, Colo.

At the Rocky Flats Site in Colorado, 800 acres of the Rocky Mountain Front Range were preserved on May 17, 1999. The "Rock Creek Reserve" is now managed by a partnership with the USFWS as a Wildlife Reserve. It is also home to a variety of threatened and endangered animal species, including the endangered Prebles Meadow Jumping Mouse. This land had served as a safety and security buffer zone for Rocky Flats for 25 years.

Three Bend Scenic and Wildlife Management Refuge Area - Oak Ridge Reservation, Tenn.

At the Oak Ridge Reservation, 3,000 acres of fields, forests and wetlands were preserved on June 24, 1999. The "Three Bend Scenic and Wildlife Management Refuge Area" is now managed by DOE and the Tennessee Wildlife Resources Agency. The area provides an important habitat and home for numerous threatened, endangered, and rare animal species.

Crackerneck Reserve - Savannah River Site, S.C.

At the Savannah River Site in South Carolina, 10,000 acres of unique plant and wildlife habitat were preserved on June 24, 1999. The "Crackerneck Reserve" is now managed by the South Carolina Department of Natural Resources as a biological and wildlife refuge. The area has been spared by development since the Savannah River Site was built in the early 1950s.

Sagebrush Steppe Reserve - Idaho National Engineering and Environmental Lab. (INEEL), Idaho

At INEEL, 74,000 acres of high-desert land was preserved on July 17, 1999. The "Sagebrush Steppe Reserve" is now managed by the Bureau of Land Management. Since the land has been a buffer zone for 50 years, it is still home to a large section of sagebrush habitat.

White Rock Canyon Reserve - Los Alamos National Laboratory (LANL), N.M.

At LANL in New Mexico,1,000 acres of canyon lands was preserved on October 30, 1999. The "White Rock Canyon Reserve" is now managed by the National Park Service, Department of the Interior — to enhance and ensure protection of the habitat and rare wildlife.

'Ideal fuel' of the future—hydrogen produced by baffled pond scum

About 60 years ago, researchers found that algae extract hydrogen from water, an important discovery, since hydrogen from water could help to meet future needs for a safe, versatile form of renewable energy. Traditionally, hydrogen fuel is extracted from natural gas, a non-renewable energy source.

In collaboration with Professor Tasios Melis of the University of California at Berkeley, National Renewable Energy Laboratory (NREL) biologist Michael Seibert and his colleague, Maria Ghirardi, discovered a new two-step process that makes it possible to harness nature's own tool, photosynthesis, to produce the promising alternative fuel from sunlight and water.

"We played a trick on the organisms," Seibert said. "What is interesting is that we are able to produce large amounts of hydrogen without imposing all the expensive, mechanical or chemical processes used before."

Seibert and his team found a "switch" that turns off the part of the algae's photosynthetic apparatus, which splits water and releases oxygen. When that switch is flipped by withholding sulfur from the culture, that part of photosynthesis stops over a daylong period. "Now, the exact mechanism we're still working on," Seibert said, "but it may be a process that uses storage product to produce the hydrogen. This will go on for a couple days, but before it stops we re-add the sulfur. At this point the cells recover, generate more storage product, and then we remove sulfur again. The process repeats and more hydrogen is produced." Seibert said he hopes the two-stage process is refined down to a single step in the future.

NREL scientist Mike Seibert and colleagues have found a way to "trick" algae into producing hydrogen. Here, Siebert works with flasks of green algae in the laboratory, where, by withholding sulfur from the plants' environment, he induces the green alga, Chlamydomonas Reinhardtii, *"pond scum," to produce hydrogen.*

Melis explained at the group's Feb. 21 meeting how depriving algae of a key nutrient, sulfur, forces it to live in an anaerobic, or oxygen-free, environment. It then assumes an "alternate lifestyle" in order to survive, conditions which force it to produce hydrogen. "It is an alternative way of breathing that the plant developed over millions of years to survive where there is no oxygen or sulfur," Melis was quoted by the *Associated Press*.

Melis said his laboratory first grows algae cells in the ordinary way—with sunlight, nutrients and water. The plant happily reproduces, growing millions upon millions of new cells. Then, the researchers cut off the supply of sulfur and oxygen to the algae, forcing it to switch to its hydrogen-producing lifestyle. "Within 20 hours, the algae turns converts from oxygen production to hydrogen production.... Then we collect the (pollution-free) hydrogen as it bubbles out of the culture," Melis said.

"This has the promise of generating fuel from some of nature's most plentiful resources—sunlight and water," noted the professor. Scientists foresee increasing by a hundred times the present rate of hydrogen production—1 liter of algae converting about a tenth of a fluid ounce per hour.

Early this year, the American Association for the Advancement of Science pronounced metabolically produced hydrogen as an ideal fuel for the time when oil and natural gas supplies run out.

In a separate Idaho National Environmental & Engineering Laboratory (INEEL) project examining algae as a safe fuel catalyst, chemical engineer Tish Stoots is collaborating with the Center for Biofilm Engineering at Montana State University and the University of Memphis. These researchers are optimizing a mat of algae to use carbon dioxide power plant emissions as a nutrient for growth.

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DOE sets up fuel economy web site

Car and truck buyers concerned about the environment or gas prices can turn to http://www.fueleconomy.gov/feg, a site maintained by the U.S. Department of Energy's (DOE) Oak Ridge National Laboratory. The web site posts information about the environmental and energy consequences of vehicle choices. Shoppers can check out U.S. Environmental Protection Agency (EPA) gas mileage numbers, compare estimates of greenhouse gas emissions and follow links to other car buyer information sites. DOE is distributing the EPA's estimates of gas mileage for every 2000 model car and light truck, plus recently added data on used cars from 1985 to 1999.

Contact Ron Walli, 865-576-0226 or wallira@ornl.gov

DOE HQ walks the walk in recycling

Department of Energy Headquarters (DOE/HQ) is one of the top five recyclers among Federal agencies in the Washington metropolitan area. Since the recycling program began in Fiscal Year 1991, DOE/HQ has recycled over 3,961 tons of paper and 57 tons of glass, plastic, and aluminum, avoiding approximately 161,000 cubic feet of landfill disposal. In FY 1999, DOE/HQ recycled over 299 tons of paper and 5.6 tons of plastic, aluminum, and glass; through January of FY 2000 DOE/HQ had recycled over 87 tons of paper and 2.4 tons of glass, plastic, and aluminum. Since beginning recycling, DOE/HQ has generated over $150,000 in recycling revenues, over $111,000 of which have been earmarked for tuition assistance at the Department's two Child Development Centers.

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SLAC site-wide recycling program: Keep them bins a-rollin' (and earn bucks)

In a Return-On-Investment project funded by the Department of Energy's Oakland Area Office in 1998, the Stanford Linear Accelerator Center (SLAC) conducted a pilot recycling project for corrugated cardboard, various types of papers, and redeemable beverage can and bottles (see 1st Quarter 1999 *Pollution Prevention Advisor*).

The pilot project proved that money could be saved by eliminating recycling subcontractor labor costs, and in 1999 SLAC implemented a site-wide recycling program to serve about 100 buildings and trailers and more than 1,200 employees and guests on its 420-acre site. That year, the SLAC recycling program began to generate a monetary return.

At first, corrugated cardboard was collected in a central 30-cubic yard dumpster, which took considerable labor time to load at the site and transport and unload at the recycler. Currently, it is deposited in 10 four-cubic-yard dumpsters distributed throughout the site. The subcontractor empties the dumpsters using a front-end loader truck and transports and unloads the cardboard to a recycler in a few hours.

Various types of recyclable paper are deposited by SLAC employees into about 420 thirty-two or sixty-four-gallon bins distributed throughout the site, labeled White Paper, Mixed Paper, and Newspaper.

The SLAC Purchasing Department successfully negotiated with the subcontractor to receive half of the market value that is paid by recycled materials buyers for cardboard and paper, which in 1999 totalled $4,900 for the 152 tons of corrugated cardboard and paper collected.

Based on recent market values, it is projected that recyclable materials will show higher returns in the year 2000. In early 1999, for example, white paper had a market value of $115 per ton; by April 2000, the value of white paper had climbed to $250 per ton. Values for corrugated cardboard have also climbed over the same period (from $45 to $80 per ton) and for mixed paper (from $25 to $50 per ton).

Recycled newspaper values have been low recently and do not provide much revenue to the SLAC recycling program at this time. Proceeds from the sale of beverage cans and bottles is kept by the subcontractor and is not split with SLAC—the volume of recycled beverage cans and bottles is quite variable, because employees may redeem these recyclables themselves.

SLAC's recycling program was not expected to show a significant increase in the total quantity of material recycled, since SLAC has had a fairly well-established recycling program for more than 10 years. However, getting some value for SLAC recyclables helps keep both the program and employees charged with the incentive to "do the right thing!"

Contact Rich Cellamare, SLAC, 650-926-3401 or rcellamare@slac.stanford.edu

2000 P2 Award Nomination from DOE/ORO

Performance-based award fee incentives drive P2 at Y-12 Plant

In 1998, the Department of Energy (DOE) Office of Defense Programs (DP) directed the Y-12 Plant to develop a site-specific, performance-based contract incentive (PBI) for pollution prevention (P2), a program carried on into Fiscal Years 1999 and 2000 as the Y-12 Award Fee Incentive for Pollution Prevention.

The goal of the PBI/Award Fee program is to establish a concrete dollars-and-cents incentive for DOE contractors to minimize the impact of Departmental operations on the environment and improve the safety of operations by reducing the generation of waste and pollution. The program aims to substantially reduce or eliminate the acquisition and use of products containing hazardous substances or toxic chemicals and achieve optimal efficiency in the consumption of raw materials, energy, water, and other resources.

The DP waste types targeted for reduction by the PBI/Award Fee incentive program are aqueous and non-aqueous low-level radioactive wastes (LLW), aqueous and non-aqueous RCRA hazardous wastes, aqueous and nonaqueous mixed (RCRA/LLW) wastes, and aqueous and nonaqueous industrial wastes, except for solid industrial wastes, which were excluded because of their overall low priority and because in most cases they are not tracked to a specific waste-generating process.

Y-12 established a team to develop the PBI/Award Fee Incentive program made up of representatives from the Y-12 DP-funded waste generating organizations and the Y-12 P2 Program Office. This team worked closely with the Y-12 DOE Site Office to reach mutually agreeable goals to be included in the Y-12 Plant Core Stockpile Management Program. The PBI team's selected tasks for FY 99 were the completion of five pollution prevention projects initiated during FY 98, and to identify and obtain the participation of the six major DP waste-generating organizations in at least five new projects for FY 99.

In FY 99, the Y-12 Plant implemented a total of 42 pollution prevention projects which reduced 25.8 million kilograms of waste at an estimated cost avoidance of $2 million. Most of the projects were ongoing recycle projects; 10 were source reduction projects. The five projects identified through the PBI/Award Fee process will result in the reduction of over 370,000 kg of waste at an estimated cost avoidance of over $1.1 million dollars.

The PBI/Award Fee team has demonstrated that award fee incentives can accomplish substantial pollution prevention. The program received so much management attention and support that its goals were exceeded in both FY 98 and FY 99. Y-12 organizational managers became more involved with the status of their respective organizations in the identification and initiation of pollution prevention projects. Also, through monthly status meetings on the incentive task, Y-12 Plant management has become more aware that DOE's Office of Defense Programs considers pollution prevention a priority. Similar award fee incentive goals and expectations have been defined for FY 2000.

Contact Eva Irwin, Y-12 Plant Pollution Prevention Office, 423-241-2581 or exi@ornl.gov

Smaller holes lead to big Return-On-Investment at Hanford

Less means more when it comes to waste from environmental restoration activities at the Hanford Site. As in many sites undergoing remedial action throughout the Department of Energy (DOE) complex, an accurate map of soil contamination at Hanford's 126-F-1 Coal Ash Pit means the difference between removing and disposing of very little low-level radioactive waste instead of a lot.

With funds from the DOE Pollution Prevention High Return-On-Investment (ROI) program, Hanford researchers combined equipment for pushing small-diameter access holes into soil with a spectral gamma logging system to collect data on distribution of subsurface gamma-emitting radionuclides in the vadose zone. They named the new, money- and time-saving characterization method the Small-Diameter Geophysical Logging System (SDGLS).

Hanford Site personnel have developed a cheaper, faster way to map subsurface radiological contamination using a hydraulic driver mounted on a truck and the small-diameter probe of a passive gamma-ray scintillation detector.

Geophysical logging is conventionally accomplished through large-diameter (four inches or better) boreholes made by bulky well-drilling equipment or cone penetrometers, methods that are quite costly and which generate considerable wastes. In the SDGLS, a Geoprobe 5400™ hydraulic driver mounted on a four-wheel drive, one-ton truck pushes a 1.75 to 2.25-inch (outside diameter) pushrod to depths up to 33 feet, deep enough for many site characterization activities. The pushrod is hollow, and the small-diameter probe, or "sonde," of a passive gamma-ray scintillation detector passes easily through the hollow, one-inch inside-diameter rod.

Gross gamma profiles for each "pushed" hole are determined by summing the spectral data produced by the gamma-ray detector responses. Both radioactive gamma-emitting contaminants and natural radionuclides (potassium, uranium, and thorium, or "KUT") are recorded; spectral analysis differentiates between KUT and man-made radionuclides when concentrations of legacy contaminants are relatively low, as they are in many DOE sites.

After successful developmental tests at two other Hanford sites, the SDGLS was able to locate and identify cesium-137 and cobalt-60 contamination at the 126-F-1 ash pit. The data suggest that large areas previously mapped as contaminated are not contaminated above cleanup levels—a significant portion of the ash pit turned out to have abnormally high concentrations of naturally occurring KUT, with minimal or undetectable concentrations of man-made radionuclides. SDGLS characterization at the Coal Ash Pit thus averted the disposal of 140,000 cubic meters of low-level waste at the Hanford Envronmental Restoration Disposal Facility, a projected yearly cost avoidance of $7,351,272.

The SDGLS technology can obtain information on the concentration, type, and distribution of gamma-emitting contamination within a few meters of the surface at a cost signicantly less than conventional boring technologies—three to five probe holes can be pushed, logged, and decommissioned in a normal working day by three personnel, plus a day of data analysis to develop the initial plots for the holes. Based on the success of the Ash Pit characterization, SDGLS technology will be utilized at several other waste sites at Hanford.

Contact Doug Duvon, Bechtel Hanford Inc., 509-372-9182 or dkduvon@bhi-erc.com

Don't smash that monitor! De-manufacture it.

Princeton Plasma Physics Laboratory (PPPL) has discovered a way to deal with its obsolete or excess computer monitors and other cathode ray tubes (CRTs). The laboratory's first choice for disposition of the CRTs is of course through the long-established Department of Energy (DOE) excess property and/or donation system (http://epic.er.doe.gov/epic). For CRTs that cannot be disposed through DOE, PPPL has located a CRT de-manufacturer and recycling vendor, Envirocycle, Inc. of Hallstaed, Penn., which has so far provided the laboratory with good service.

After scheduling shipment with the vendor, excess CRTs are packaged in bulk cargo containers. The cost for proper disposal as waste of the CRTs in this shipment was estimated at $4,800, while the cost of recycling plus shipping was an estimated $800, for a total estimated savings of $4,000.

The shipping containers have one removable side, which allows packaging technicians to walk into the shipping container with the CRTs, limiting the risk of injuries. Also, the box has a cardboard horizontal layer that can be added, allowing two levels of CRTs in each bulk cargo container. The maximum top load capacity of each bulk cargo container is 1,710 pounds, so they can be stacked two high in a transport trailer.

PPPL has experimented with having these containers shipped back from Envirocycle, so that they possibly could be utilized for multiple trips. PPPL paid the freight costs for a return shipment—it was cheaper to ship the containers back than to buy new. Unfortunately, the returned shipping containers were damaged to the extent that they could not be reused, and the cardboard was recycled.

The glass generated from de-manufacturing CRTs at Envirocycle is sent to Techneglas in Ohio for actual recycling into new monitors. Envirocycle sends all the plastic waste from the CRTs to MBA Polymers Inc., in California, which grinds, separates and identifies the plastic materials for recycling.

PPPL's Environmental Restoration/Waste Management Division interviewed Techneglas to discuss their environmental practices before any monitors were shipped. PPPL's Materiel Control Division handles the actual packaging and shipping of the obsolete CRTs.

Contact Tom McGeachen, PPPL, 609-243-2948 or tmcgeach@pppl.gov

New DP workshop: 'Learn from the leaders' in Portland, Oregon

Start planning a fall trip to "The City of Roses" now. The Department of Energy (DOE), Office of Defense Programs' (DP) 17th Biannual P2 Hands-On Training Technology Workshop will be held Tue. Oct. 31 through Thur. Nov. 2 at the Fifth Avenue Suites Hotel in downtown Portland, Ore., on the banks of the Willamette River.

Also known as "The City of Bridges," and "The River City," Portland is as well-known for a pro-active commitment to environmental stewardship as for the beauty of its natural setting. No wonder that the theme of the first DP workshop in the Beaver State is *Conserving Natural & Financial Resources: DOE Learns From The Leaders*.

Information on the exact location, agenda, topic groups, and site visits is not yet complete, but will be available later this summer on the workshop website at http://www.doe.gov/dp45/p2 (click on "Current Workshop").

Contact Julie Lyons, McPherson Environmental Resources, Inc., 423-543-5422 or mers@usit.net

U.S Department of Energy 17th Biannual Pollution Prevention Hands-On Training Technology Workshop

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United States
Department of Energy (DP-42/GTN)
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Germantown, MD 20874-1290

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