BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Various Options Available for Hazardous Waste Cleanup

There's more than one way to clean up hazardous waste.

The hard part is choosing whether to melt or contain or haul away the waste from 50 underground waste storage pits at BNL.

"The EPA [Environmental Protection Agency] and New York State would like to have the pits cleaned up and remediated by next October," explained Jim Brower, Landfills Project Manager for BNL's Office of Environmental Restoration (OER). "We need to decide by early September."

The pits, which are located southeast of BNL's recreation fields, contain laboratory waste buried in the 1950s and '60s before regulations were enacted regarding the disposal of waste. Used until 1966, the pits received materials such as laboratory animal carcasses, glass bottles and chemicals. Three pits also could contain small amounts of radioactive material.

Brookhaven has been working to clean up its hazardous waste since the Laboratory was named a Superfund site in 1989. Now BNL is considering several options to eliminate the waste contained in the 50 pits.

Though the waste is not currently causing problems off site, Brower said removing the waste is necessary because the Lab lies over an aquifer that is the sole source of water for much of Long Island. "We can't have buried waste and possible chemical contamination of the aquifer," he said.

OER has narrowed its search to three possible methods to clean up the site's buried waste:

• **In situ vitrification** (ISV) uses electricity to heat the waste from 1,500 to 2,000 °C (2,732 to 3,632 °F). This incinerates any organic material and melts any hazardous metals or radioactive materials into a glass ball. ISV currently is being tested to see if the soil and waste combination will work at BNL.

• The **impermeable-barrier** method involves building a V-shaped cement and polymer tub below the waste to contain it. This method prevents leaks into the groundwater and was tested on an actual glass pit at BNL.

• The traditional **dig-and-haul** method also is an option. The waste would be dug up by a backhoe, then sorted by hand. The remaining hazardous waste would be shipped to a waste-storage facility.

Brower said the best alternative right now is ISV, which could cost between $8 and $10 million for all 50 pits. He favors vitrification because it cleans up toxic organic chemicals, the most prevalent kind of waste in the pits, and keeps the radioactive materials from escaping without generating additional waste.

The dig-and-haul method, on the other hand, often creates more waste because bottles containing waste can break while being dug out of the pits. Also, workers could potentially be exposed to hazardous chemicals. The cost for this method would be between $8 and $9 million.

"There are a lot of uncertainties with that method because we don't know what we're digging up," Brower explained. "There might be toxic fumes released or incompatible chemicals reacting with each other if the bottles happen to break or spill."

Building a cement and polymer barrier probably will not be the solution, Brower said, even though the estimated cost is lowest, at $6 to $7 million.

"Right now, the state and the EPA are not in favor of that as a long-term, permanent solution for waste that may have organic chemicals," Brower noted. "They have no assurance the cement will remain intact."

No matter which process eventually is used to clean up BNL's hazardous-waste pits, as the following stories show, both the in situ vitrification and impermeable barrier methods have promise for solving problems at U.S. Department of Energy sites nationwide. — Andrea Widener

Melting Waste Underground

You are getting very sleepy.

Now gaze into the crystal ball. What you see might be the future of BNL's hazardous waste-remediation program.

Though it is not quite crystal, the glass ball that interests the Office of Environmental Restoration (OER) was created here last month to test a method of cleaning up underground waste. The technique involves heating waste and the surrounding soil to extremely high temperatures, destroying organic material and incorporating any other hazardous waste within a glass ball.

"This technique is relatively new," explained OER's Jim Brower. "It has been experimental for the last couple of years, but it hasn't been widely used yet."

The method is called in situ vitrification (ISV): In situ refers to the test taking place underground, and vitrification means to heat up until it turns to glass. The method was developed several years ago at Pacific Northwest National Laboratory, and the technique is now being implemented by Geosafe Corp.

To start ISV, four carbon electrodes are placed in the ground surrounding the glass pit. A line of graphite is placed between the electrodes to start the current flowing through the waste.

This current heats the soil to temperatures from 1,500 to 2,000 °C, creating a molten liquid of soil and waste. Once the ground and waste start melting, they serve as a conductor of the current. The more soil and glass melt, the further the current reaches out horizontally and vertically.

"The sand and waste melt into glass," Brower explained. "Any organic chemicals are completely destroyed."

He said soil conditions on Long Island are ideal for this method because the sandy soil melts easily into glass.

The heating continues until the entire pit has turned into molten glass. When it hardens, the material turns into a glass ball that looks like a boulder. (continued on page 2)

Peter Horton

Researchers examine the monolith of glass that remains after testing a technique to melt glass and chemical waste: (from left) Gail Penny, DOE Environmental Restoration Project Manager, Brookhaven Group; William Gunther, Manager, Office of Environmental Restoration (OER); Marsden Chen, New York State Department of Environmental Conservation; Steve Minnick, Geosafe Corp.; Jim Brower, Landfills Project Manager, OER; Eric Dysland, Geosafe; and Brett Campbell, Geosafe.

Roger Stoutenburgh

At this site southeast of BNL's baseball fields, the new impermeable barrier technology to contain hazardous chemical and radioactive waste has been tested. Liquid cement was pumped at high pressure into this drill with holes on both sides. In the ground, the drill bit was rotated to create disks of cement. These disks were piled on top of each other until a long, solid cement column was formed. Together, many of these columns eventually will form a V-shaped trough to contain hazardous waste. A polymer layer was placed on the inside of the barrier to enhance its ability to retain contaminants.

'Bathtub' Protects Groundwater

A massive bathtub could clean up a potentially large problem: hazardous waste.

The technique would surround underground waste with a cement and polymer barrier. Unlike being in a bathtub, however, the contained waste would not be able to drain into the surrounding area. Then the waste could either remain in the ground or be excavated without fear of further contamination.

Cement serves as the first layer because it is strong, durable and readily available, said Brian Dwyer, who co-developed the "bathtub" method at Sandia National Laboratories in Albuquerque, New Mexico. Then a layer of polymer is put on top of the cement because high radiation levels or acidic soil can deteriorate cement.

"If you know from the very start what you want to contain, then you can do a little calculating and tailor your cement to match the soil," Dwyer explained. "Over time, the waste won't leak out of it. It would be permanently stable." (continued on page 2)

Lecture Coming Up

H. John Wood, Lead Optical Engineer and Science Outreach Manager of the Hubble Space Telescope Project at the NASA Goddard Space Flight Center, will give the next AUI Distinguished Lecture. On Wednesday, August 21, at 4:30 p.m. in Berkner Hall, he will speak on "The Hubble Space Telescope: Optics and New Science."

A Face-Lift Before a Fire

The Engine 3 Replacement Committee for the Fire/Rescue Group in the Safety & Environmental Protection Division stands next to BNL's soon-to-be brushfire truck (left). This 5-ton, 6-wheel drive, 55,000-pound truck, which was transferred to BNL from the U.S. Army's Fort Drum, will be outfitted with a water tank, pump hose, generator, roll bars and other fortifications just like the truck from the Brookhaven Fire Department, pictured at right. "A serious brushfire would probably stop work here at the Lab," said BNL's Deputy Fire Chief, Mike Carroll, who explained that this new truck will be used to fight brushfires by being driven overland carrying its own water supply. It will tow the Fire/Rescue Group's hazardous materials trailer in the event of a chemical spill to provide the appropriate cleanup equipment. The conversion will start in September to make the vehicle ready for the spring brushfire season in March and April. Appointed by Fire Chief Jim Roesler, the Engine 3 Replacement Committee includes: (from right) SEP's John Foley, Mike Carroll, Ken Licata and Jim Vaz, and Jack Russell of the Division of Contracts & Procurement. SEP's Cyril "C.J." Pinto, not pictured, is also on the committee. — Sarah Gilbert

Roger Stoutenburgh

New Security Steps At Main Gate

Due to heightened concerns over security at the Laboratory, procedures at the Main Gate have changed. "While these new security steps may pose some inconvenience to staff and visitors, we ask for your cooperation and support in their implementation," said Sue Davis, Associate Director for Reactor, Safety & Security.

The following procedures are now in effect at the Main Gate:

• **Visitor ID** — Visitors to BNL must provide the security police officer with the name of the individual they are visiting.

• **Police Group notification** — To expedite site access for visitors, the Police Group should be notified in advance when employees or guests are expecting visitors to arrive on site. Also, if there will be a seminar or meeting of more than 20 people, the Police Group should be informed at least 24 hours in advance and provided with a contact person.

During normal working hours, call Police Inspector Len Butera, Ext. 4691, or Police Group Manager Al Berretta, Ext. 2355; after hours, call the desk at Police Headquarters, Ext. 2238.

• **Vehicle registration** — Vehicles used by BNL employees and long-term guests *must* be registered and have a valid BNL sticker.

Registration hours are from 8:30 a.m. to 5 p.m., weekdays, at the Brookhaven Center, Bldg. 30.

• **Special passes** — Passes allowing site access are being issued to parents of children attending the Child Development Center and the Upton Nursery School, and to patients receiving treatment on site.

• **Delivery verification** — All deliveries — flowers, pizza, etc. — are being verified, so be sure to provide the delivery person with the name of a person to contact.

• **Random checks** — Police officers are making random checks with designated contact people to confirm the claims of those requesting access to the site.

See BNL on TV

This Sunday, August 11, Brookhaven National Lab will be featured on "Profiles of America: Agents of Change," a 30-minute television special produced by Telecast Production Group, an independent production company.

The program will air at 4 p.m. Eastern time on CNBC, the NBC Cable Network. CNBC broadcasts on channel 24 for Cablevisions of East Hampton, Hauppauge, Islip and Riverhead, and on channel 48 for TCI Cable of Brookhaven.

Cement 'Bathtub' (cont'd.)

John Heiser said the impermeable barrier method is well suited for containing underground storage tanks. Heiser works in BNL's Department of Advanced Technology and helped create the technique, which was tested in conjunction with BNL's Office of Environmental Restoration.

Before construction began for the current test at BNL, the glass-pit area was examined to determine where the waste was located. In this case, the waste was found using ground-penetrating radar that detects differences between the soil and what is around it.

Once the waste was identified, researchers decided what shape the barrier should be — a long V-shaped trough with flat triangles at both ends. A previous test barrier at an uncontaminated site in Hanford, Washington, was shaped like an inverted cone.

Soup-like liquid cement was pumped at high pressure into the ground. The cement mixed with sand and rocks in the soil and formed a solid cement column. The process was repeated until the trough shape was complete.

Then, polymer was injected onto the inside of the barrier in a similar fashion. In total, the cement was about one-and-a-half meters thick, and the interior polymer layer was eight to 12 inches thick. The cement layer provides structural integrity, while the polymer layer reduces permeability

The barrier technique should be ready to use elsewhere as soon as the BNL tests are completed, Heiser said. Applied Geotechnical Engineering and Construction of Hanford, Washington, has done most of the work on the barrier project. — Andrea Widener

Melting Waste (cont'd.)

These boulders vary in size, depending on the amount and kind of waste in the pit. The test pit contained one ton of waste similar to what is in the 50 pits, and the final glass ball was one yard in diameter.

The actual waste pits at BNL are significantly larger, Brower explained. He expects the average glass pit to be around 15 to 20 tons, but they could be as large as 50 tons.

Though the researchers dug up the glass ball from the test run, most of the glass boulders would remain underground indefinitely.

"I like the vitrification because it is a nice, simple solution that doesn't generate a lot of waste," Brower explained. "It is a permanent solution that cleans up toxic, organic chemicals. It prevents any radioactive materials from escaping into the environment." — Andrea Widener

Arrivals & Departures

Arrivals

Ruiliang Wang.....App. Science

Departures

This list includes all employees who have terminated from the Lab, including retirees:

Wayne A. Broome.....NSLS
Marie De Angelis.....Safety & Envir. Prot.
Robert-Irving Moore.....Medical
Joseph Pasciak.....App. Science
Yian Biao Zhang.....Biology

Addled Addresses

• Brookhaven Natl Lad
• Brookhaven Natl Library

Note to Employees:

Attendance at lectures, meetings and other special programs held during normal working hours is subject to supervisory concurrence.

What a Deal!

John Heiser, of BNL's Department of Advanced Technology, started looking for a polymer to line an underground cement barrier for hazardous waste anticipating it would cost $19,000. In talking to the contractor, though, he learned they had several cans of polymer left over from a job they had completed years ago.

"It would have cost them $75,000 to $100,000 to dispose of it," Heiser said. "They said if it were still good, then we could have it."

The contractor called the polymer's manufacturer, GeoChemical Corp., whose representative said the polymer probably was still good since it was liquid. The president of GeoChemical even came out to make sure the polymer would meet Heiser's standards.

By using the polymer that would have been wasted, Heiser and his group saved the U.S. Department of Energy around $100,000. — A.W.

Here & There

More than 40 scientists, as well as many graduate students and postdocs, from a wide range of institutions attended a Workshop on Structural Characterization of Surfaces and Interfaces Using Neutron Reflectivity at BNL on May 22-23.

Neutron reflectivity is a technique that utilizes neutrons produced at BNL's High Flux Beam Reactor (HFBR) to study the surfaces and interfaces of materials. Held in conjunction with last May's National Synchrotron Light Source Annual Users' Meeting, the workshop emphasized the complementarity of neutron and x-ray reflectometry and other surface-sensitive techniques in providing such information.

In his address to the workshop, John Axe, Head of BNL's Center for Neutron Science, focused on the need for better neutron sources and improved instrumentation.

Axe discussed the upcoming move of the reflectometer located at HFBR beamline H9A' to the rebuilt H6 beam line, which features supermirror neutron guides. When the move is completed, by the end of the year, the new beam line is expected to provide a gain in neutron intensity of at least an order of magnitude, making the flux of the reflectometer one of the brightest available.

The workshop also included a poster session and several invited talks.

A printed copy of workshop transparencies is available from Rae Greenberg at the HFBR Users Administration Office, Ext. 5564. For more information about the HFBR reflectometer, contact beam line scientist Diep Nguyen, Ext. 2329 or e-mail diep@bnl.gov. Or check out the reflectometer's Worldwide Web page at http://bnlnr2.hfbr.bnl.gov.

In Memoriam

Herbert S. Iverson, who worked at BNL for almost 27 years before his retirement in 1980, died on July 10. He was 75 years old. He had started in the Electrical Shop as an electrician A on September 28, 1953, and he retired from the Plant Engineering Division as a construction inspector on June 30, 1980.

Rumor Hotline

Dial ASKI (Ext. 2751)

verification with confidentiality

Concert Features Instrumental Music of Northern India

Sponsored by BERA's Indo-American Association, a concert featuring Satish Vyas and Sadanand Naimpalli, artists who specialize in playing classical music of northern India, will be held at BNL on Saturday, August 17, at 7 p.m. in Berkner Hall.

Son of India's top-notch vocalist C.R. Vyas, Satish Vyas had his initial training in vocal music. Under the tutelage of the renowned maestro, Shiv Kumar Sharma, he later learned how to play the santour, a dulcimer that originated in Persia but is now common in India. Now a master santour player himself, Vyas made his first solo concert tour to the U.S. in 1992. He has also toured Canada, Europe, Russia and Japan.

Sadanand Naimpalli will accompany the harp-like tones of the santour with his expert playing of the tabla, a pair of different-sized drums.

Naimpalli has won many honors in musical competitions in India. At age 17, he had been named the most accomplished young tabla player at the Interuniversity Youth Festival, and he was selected by the Indian government and UNESCO to tour Europe. Naimpalli has accompanied many of India's most famous musicians in live concerts and recordings.

Tickets cost $8 per person and $12 per couple. Families with children under 18 years old will be admitted for $15, all inclusive. Purchase advance tickets at the BERA Sales Office, from 9 a.m. to 1:30 p.m. weekdays; or from Animesh Jain, Ext. 7329; Piyush Joshi, Ext. 3847; Anand Saxena, Ext. 4844; or A.M. Topé, Ext. 5672. Tickets may also be purchased at the door on the evening of the performance.

BNL Runners Run Away With Corporate Challenge

Roger Stoutenburgh

In June, the men's and coed running teams of the BNL Roadrunners placed first, and the women's team placed sixth in the Chase Corporate Challenge held in Eisenhower Park in East Meadow. The competition included 151 men's teams, 92 coed teams and 166 women's teams, and, as a result, all three BNL teams have been invited to participate in the national championship race to be held in New York City in October. Outstanding among the BNL runners was Jennifer Schretzmayer, Chemistry Department, who placed first overall among all women entrants with a time of 20 minutes and 51 seconds for the 3.5-mile course. Pictured above are some of the BNL runners who participated: (front, from left) Joe Barkwill, Gerry Granzen, Brian Boyer, Paul Geiger, Conrad Koehler, Mike Mapes, Rich Ferrieri, (back, from left) Diane Hatton, Jennifer Schretzmayer, Craig Diaz, Sharon Zuhoski, Don Shea, Emmanuel Onillion, Trevor Sears and, Dave Phillips. Not shown are: Michael Cowell, Mary Dernbach, John Duggan, Don Mackay, Skip Medeiros and Ed Sierra. — Sarah Gilbert

Pine Barrens Forum To Be Held at BNL

On Friday, October 4, BNL will host a research forum on the Long Island Pine Barrens forest, featuring discussions of recent and ongoing studies of the area's hydrology and ecology. The forum is sponsored by the Central Pine Barrens Joint Planning and Policy Commission, the Long Island Groundwater Research Institute at the State University of New York at Stony Brook and BNL. There is no registration fee. To attend, call Jan Naidu, Ext. 4263, or 632-9780 or 632-8674 by September 15.

Reports Available

The following reports are available from the designated contact to Lab staff and affiliates of DOE, AUI and NRC. Others may purchase them from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

BNL-52495
Contact: Janet Sillas, Ext. 2345
Brookhaven Highlights 1995. Mona S. Rowe, editor

BNL-52503
Contact: Kathy Tuohy, Ext. 3845
Muon-Muon Collider Pre-Conceptual Design Report. The $\mu^+\mu^-$ Collider Collaboration

BNL-52505
Contact: Grace Webster, Ext. 3227
Low-Level Liquid Radioactive Waste Treatment at Murmansk, Russia: Technical Design and Review of Facility Upgrade and Expansion. R.S. Dyer, J.M. Diamante, R.B. Duffey, R.E. Davis, P.D. Moskowitz, K. Bryn, P. K. Pedersen, O. Berstad, E. Aakre, K. Gussgard, A.A. Sorlie, V. V. Ruksha, M.P. Fillipov, A. Tumparov, S. Pichugin, E. Belyakov, R. Penzin, A. Shvedov

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Softball

Standings as of August 2

League E1		League E3	
System	7-2	Mesocyclones	9-2
Blue Jays	8-3	Pick-Up Stick	5.5-5.5
Phoubars	7-3	Bombers	4-8
Ice Men	6-4	Medical	3.5-7.5
Magnets	6-5	**League M1**	
Titans	2-9	Gour-Mets	7-3
Cleen Sweep	0-10	Snake Bites	7-3
League E2		Stingrays	7-3
Hammerheads	8-3	Good Timers	5-4
LightsOut	8-3	OER Wellheads	2-8
CCD	7-4	Parke Avenue	1-8
Contaminators	7-4	**League M2**	
Hy Tech	7-4	Skeleton Crew	6-2
Phase Out	5-6	Varmints	5-3
Scram	4-6	No Names	3-5
Feds	4-7	Stray Cats	4-4
Phytinphytos	4-7	What's on 2nd	4-4
Sure Fire	0-10	Monday Nite Live	1-7

Note: *The address for the World Wide Web page of the BNL Softball League is http://pubweb.bnl.gov/~l2ball/*

From Infants to Graduates

On June 20, at the tender age of five years old, the 1996 graduating class at BNL's little red schoolhouse made history as the first group of children to go through the entire Child Development Center (CDC) program since it opened in September 1991. The majority of the class started at the CDC's infants' center. One of them was Courtney Thyberg (middle row, far left), whose proud father Bruce Thyberg, Plant Engineering Division, snapped this photo: (back, from left) Jennifer Scanlon, the CDC teacher who has been with these children the longest, teacher Nancy Burke, teacher Sharon Rodriquez holding Angela Hackenburg; (middle, from second left) Susana Debbe, Lindsay Giacalone, Christine Cummings, Brooke Johnson, Taryn Boucher, Addison Baxter, Emma Marsch; (front, from left) Bryan Kelly, Marie Sweet, Kenny Erlich, Heather Barcelo, Alan Sweet, Christopher Connelly and Eric Bennett. Students not present are: Samantha Anderson, Sebastian Andrews, Russell Archer, Zachary Bowen, Kali DeCastro, Alexa Greves, Kelsey Hartmann, Alice Huang, Kristen Madonia, Derek Nehring, Simon Peggs, Rachel Sikora and Jenna Trunk. Thyberg says that, as yet, "there are no plans for a class reunion when they graduate high school in 2009."

United Way Responds to Flight 800 Crash

Long Island's United Way, for which BNL has an annual employee-contribution campaign, has established a fund for the families of the victims on TWA Flight 800, which crashed offshore Fire Island on July 17. Donations, which will be spent on the families' social service needs, may be sent to: United Way's TWA Family Member Fund, Long Island's United Way, 457 Commack Road, Deer Park NY 11729-4511.

Contributions may also be sent directly to the Long Island Chapter of the American Red Cross, a United Way agency that has the primary responsibility for response to this disaster. In addition, United Way member agencies are providing mental health professionals to counsel the families and friends of victims, and the workers involved in the search and recovery.

Computing Corner

The Computing & Communications Division (CCD) offers the following:

MIX Meeting

On Wednesday, August 14, the next Monthly Information eXchange (MIX) meeting with CCD will be held at 11 a.m. in Room B, Berkner Hall. User training and video conferencing will be discussed, and all are welcome.

The Web, Internet & You

On Friday, August 16, in the second-floor seminar room of CCD, Bldg. 515, a seminar entitled "The Web, Internet and You" will be presented twice: at 10 a.m. and 1:30 p.m. During the seminar, the capabilities, components and terminology of the Internet, intranets and the World Wide Web will be discussed.

To reserve your seat, contact Pam Mansfield, Ext. 7286 or e-mail pam1@bnl.gov, or Ed McFadden, Ext. 4188 or e-mail emc@bnl.gov.

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position. Consideration is given to candidates in the following order: (1) present employees within the department/division and/or appropriate bargaining unit, with preference for those within the immediate work group; (2) present employees within the Laboratory; and (3) outside applicants. In keeping with the Affirmative Action plan, selections are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Human Resources Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Human Resources, and second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (344-7744), for a complete listing of all openings.

Current job openings can also be accessed via the BNL Home Page on the World Wide Web. Outside users should open "http://www.bnl.gov/bnl.html", then select "Scientific Personnel Office " for scientific staff openings or "Employment Opportunities" or "BNL Human Resources Division" for all other vacancies.

SCIENTIFIC RECRUITMENT - Doctorate usually required. Candidates may apply directly to the department representative named.

SCIENTIST - Trained in psychology or related discipline with work experience in at least one, preferably more, of the following areas: organizational, programmatic, methodological and developmental aspects of training; organizational and management influences on safety performance in the international community; and organizational and cultural issues related to the operation of Soviet-design reactors. Work will initially focus on issues related to international nuclear safety programs, but will extend into other technological areas. Experience in applied and field research is desirable. Proven ability to prepare technical reports, give research presentations and interact with project monitors is also necessary. Contact: Sonja Haber, Department of Advanced Technology.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

NS 4705. ADMINISTRATIVE POSITION - Requires bachelor's degree, MBA in MIS preferred; knowledge of re-engineering practices and work-flow technology; experience in system analysis and design; and excellent communication skills. Will provide support to BNL's departments and divisions in their examination of business practices and the introduction of work-flow and imaging technology. Financial Information Systems Division.

DD 5004. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent experience, excellent typing and communication skills. Duties will include typing procedures, correspondence and reports; making travel arrangements; file maintenance; and organization for engineering group. Knowledge of WordPerfect and Xywrite highly desirable. Reactor Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

MRK/AUI. AUDITING POSITION - Requires a BS in accounting or business administration and several years' relevant experience in public accounting or corporate audit. Excellent analytical, written and oral communication skills are also required. Will assist in the completion of financial, subcontract and management systems audits. Associated Universities, Inc.

NS 6188. PROGRAMMING/ANALYST POSITION - Requires MS degree in computer science or related field, and comprehensive experience in real-time software development. Experience in C programming, demonstrated skills in problem solving, software design, hardware/software integration techniques and debugging of large systems necessary; C^{++}, VX Works and accelerator experience highly desirable. Will participate in designing and developing embedded application software for real-time systems in the RHIC/AGS control system. Will work closely with hardware specialists in the system-integration process and be expected to provide support for new and existing systems. Alternating Gradient Synchrotron Department.

DD 3837. HAZARDOUS WASTE TECHNICIAN - Under general supervision, performs work related to the operation of the hazardous-waste disposal facilities of the Safety & Environmental Protection Division. Includes but is not limited to pickup, storage, packaging and bulking of hazardous waste. Responsible to complete and maintain any certifications required for the operation of these facilities. Safety & Environmental Protection Division.

DD 3838. HAZARDOUS WASTE TECHNICIAN - (term appointment) Under general supervision, performs work related to the operation of the hazardous-waste disposal facilities of the Safety & Environmental Protection Division. Includes but is not limited to pickup, storage, packaging and bulking of hazardous waste. Responsible to complete and maintain any certifications required for the operation of these facilities. Safety & Environmental Protection Division.