

Particle Post July 2012

"The first wealth is health"

Previous issues October 2004

Note from the Chair Thomas Roser



I hope everyone is staying cool during this hot period of the year. Fortunately we ended the RHIC run when we did and avoided a lot of downtime from overheating equipment. As you heard there was a very serious injury recently when an F&O worker fell 15 feet from a ladder. We should take this incident as a reminder to review our work planning efforts and remain vigilant to identify all hazards in our work. Particularly important during this hot period is to be aware that your physical condition can be affected by excessive heat stress and/or dehydration. This might have been a factor in the ladder incident since apparently there were no safety deficiencies with the ladder. So, please stay cool and drink enough water.

Administration Stephanie LaMontagne-McKeon



BNL has advised the Nuclear Physics Program Office that a run of 15 weeks is possible in FY 2013 with no increase in budget authority. Please note, however, that our ability to do so depends on our ability to constrain expense for the balance of FY 2012. As we begin maintenance and upgrade activities over this shutdown period, please make every effort to limit material expenditures to those items necessary to the completion of tasks identified as necessary prior to Run 13.

In addition to limiting our requests for goods and services, ensuring that the cost to our programs is accurate is an important element of cost control. All C-AD employees have a role in this aspect of cost control. Department employees are urged to review monthly transaction reports to confirm that the materials and trade labor charged to our projects is our own and that those expenses are charged to the appropriate program. Monthly reports for direct labor charges, stores issues, credit card activity and trade labor charged via work orders and RFQ's, etc. can be accessed via the Department's Home Page. From the portal menu on the left hand side of the Administrative Division's home page, select "Reports". (<http://intranet.bnl.gov/cad/admin/reports/>)

The following comments are provided to assist you in the process of reviewing cost:

(1) Stores Issues

Only you know what you ordered and whether or not you received it. Errors abound. The pick-ticket system generates charges based on your request – not the withdrawal and delivery of the item. If the item you have requested is on back order, you may still be charged. Reorders of misplaced deliveries or items on backorder, double the price we pay.

When ordering items from stock, note the unit of issue to ensure that you do not request more items than needed. For example, if 5 items are needed, ordering 5 boxes of 5 each increases the cost by 400%.

(2) Trade Labor

Only the requestor or someone knowledgeable about the work being done is qualified to make an assessment regarding the reasonability of the charges. Please ask yourself if the labor charges occur in the same time period in which the work was performed and if the number of hours charged is consistent with your knowledge of the work.

Additionally, please identify building and grounds maintenance that was inappropriately charged to our programmatic accounts. Maintenance of the courtyard, bathroom plumbing repairs, re-lamping of offices, etc is included in the space charge we pay.

(3) Manpower Reporting

Pay particular attention to personnel outside the Department who are charging labor to C-AD projects. Is it appropriate? Are the number of hours charged reasonable?

(4) Accounting and Budget Summaries

If your job includes financial oversight responsibilities, please review the monthly cost and commitment reports for those project numbers for which you are responsible. Review the reports with a critical eye and ask questions. Do the charges appear consistent with your understanding of the work? Our material cost is relatively consistent from one month to the next. Look at the total dollar value for low value purchases, store issues, credit card activity and travel. Is it what you expected to see? If not, ask why.

Finally, please be aware that none of the PeopleSoft systems through which we request materials or trade labor require approval based on established signature protocols. Thus, it is possible for other Laboratory organizations to approve and submit purchase requests on our projects. In some cases, this is appropriate and in others, may result from a mistyped project number or misunderstanding regarding the appropriate source of funds. Erroneous charges remain on our books if we do not identify them and take corrective action.

Above all, remember that a well-placed question puts others on notice that we are vigilant about reviewing the charges to our projects. My staff is available to assist you in accessing whatever data is needed to investigate questionable charges and process correcting entries when necessary. Your participation in this effort will help the Department to make the best use of its limited funding.

Accelerator Division Wolfram Fischer

The RHIC Run ended on a high note, making it the most varied and overall perhaps the best run to date. After the successful completion of the copper gold run, a two-day test of lower energy operation followed, led by Christoph Montag, in which gold-gold collisions were provided with a beam energy of 2.5 GeV/nucleon, the lowest energy to date. The warm-up began on 27 June 2012. In the days after RHIC operation stopped, He-3 was delivered by EBIS and successfully accelerated in the Booster and AGS. This is in preparation of future operation with polarized He-3. A polarized He-3 source is currently being developed at MIT, and can be attached to EBIS within about 1 year.

Now that the RHIC operation is finished, the shut down work has begun, and we aim to extend the excellent machine availability of Run-12 into the next run. Run-13 will feature a long polarized proton run at full energy as the main operating mode. The two largest upgrade projects for the next run are a new polarized proton source, build by Anatoli Zelenski, and electron lenses to mitigate the beam-beam effect.

Experimental Support & Facilities Division Phil Pile (Ghost written by Yousef Makdisi)

By June 25th, STAR and PHENIX completed the first physics run with 100 GeV/n copper on 100 GeV/n gold. The strong performance of the stochastic cooling devices and the fine tuning efforts by the operators, kept the integrated luminosity above projections and both experiments reached their Beam Use Proposal goals. This, along with the successful uranium on uranium run, represents another milestone for RHIC. The machine was



then reconfigured for a two-day test run with gold beams at 2.5 GeV/n well below injection in an effort to improve the beam lifetime and extend the reach of the energy scan in search for the critical point. This test ended on June 27 with 3-hours with beams in collision where STAR and PHENIX attempted to record a few events. RHIC began preparing for cryo warm up and the experiments proceeded to prepare for the summer shutdown. This shutdown will witness the STAR installation of a new beryllium beam pipe, complete the FGT, add to the Muon detectors, and install a test pixel for the HFT. PHENIX will remove the FVTX and VTX for replacement of damaged ladders, remove and fix the Muon Pixel Calorimeters that were damaged because of a kicker pre-fire, capacitor replacement in muon tracking station-1 and maintenance of the larger muon tracking chambers inside the magnets, and improve the cooling for the silicon vertex detectors as well as the RPC-1 chambers. Finally installation of a new window for the Drift Chamber west.

The NSRL program completed a successful Run 12 B on June 26th and followed by a run for NRO testing single event upsets which ended on June 30th. BLIP continued its successful run through June during which a short exposure of Th-232 metal foils was carried out as a test for Ac-225 production. This is done in collaboration with ONRL. BLIP will continue running through the end of July.

Overall RHIC Run 12 was quite a success and the experiments have collected significant new data that are being analyzed in preparation for Quark Matter 2012 that will take place in Washington DC this August. The total number of cryo weeks for Run 12 should be 23.6 with about 18 weeks of physics data taking, a great ratio considering the number of ion/energy changes. We plan to begin operation for Run 13 about 1 January 2013.

Accelerator R&D Division Ilan Ben-Zvi



On travel - will input next month.

Operations Paul Sampson



The great successes of Run 12 continued until Saturday June 31st, when all of running, with the exception of BLIP concluded for the year.

Despite two large power failures, the Cu/Au run was another great success with both experiments and the Accelerators exceeding their goals for the run. The final mode of running for RHIC was low energy Au/Au (5GeV cm). Though there was little time and a rare and particularly complex setup, goals for this test run were also met, with collisions being established in several stores. RHIC warm up began on Wednesday June 27th following power supply tests.

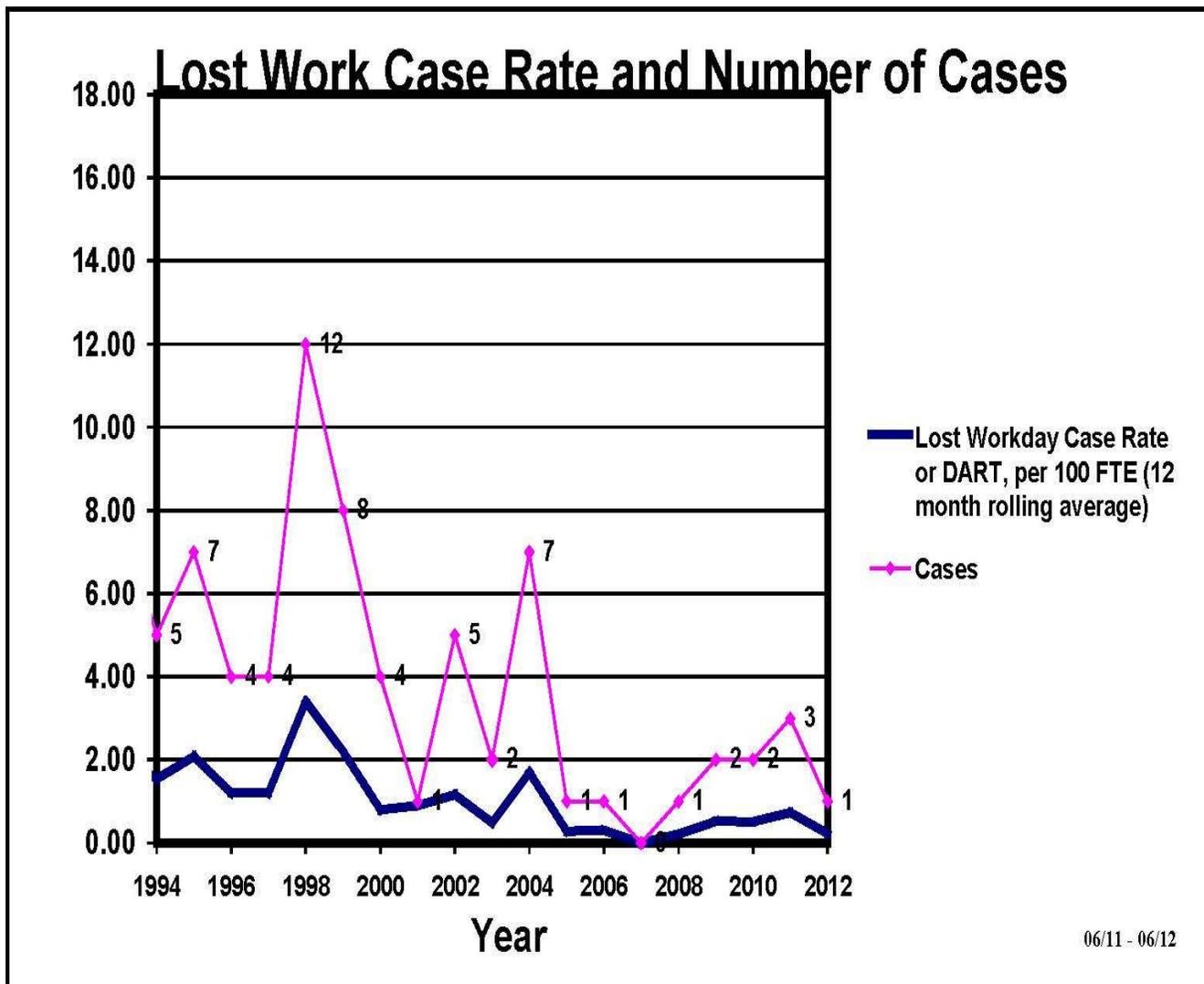
The end of the RHIC run was followed by a successful test run of He3 in the injectors. Beam was established and polarimeters tested in the AGS with the full complement of polarized equipment (snakes quads and bumps). The He3 beam was provided from EBIS.

Accelerators have been secured for the shutdown. The RHIC ring has been down posted to ODH0, removing the requirement for escape packs and POMs when entering the enclosures.

During the shutdown, service outages will be posted on the CATV system and on the web at the link below.

For schedule updates see: [This Week](#)

Safety Stats



C-AD Occupational Injury Statistics

For Year 2011 For Year* 2012

	FOR YEAR 2011	FOR YEAR 2012
First Aid Cases	4	1
Recordable Cases	3	1
Lost Work Cases	3	0

* Calendar Year through 6/12

REMINDER: TLD exchange is done the *FIRST FRIDAY* of the Month.

EXCHANGE DATE: FRIDAY, August 3, 2012

Pete Cirnigliario



ARRIVALS

Binping Xiao joined the department on July 3 working with Qiong Wu in the LHC Accelerator Research Group.

WELCOME!

LEAVE OF ABSENCE

Chien-Ih Pai, Mechanical Systems Group started LOA effective June 30.

GOOD LUCK!



Inside RHIC. Please click on link to the left to view the latest web publication of Inside RHIC.



*We wish all of you born in **July**
a happy and healthy year ahead.
Birthday people ONLY click on cake*



DID YOU KNOW

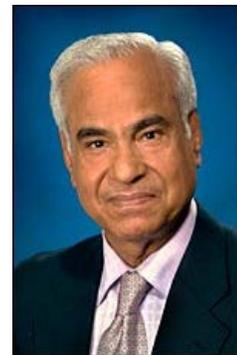
Research Paving the Way to Personalized Medicine for Cancer Treatment

By Suresh C. Srivastava

You're not me and I'm not you.

The differences between us, medically, are significant, and for this reason treatment of many insidious diseases, including many cancers, is a challenge, since the way one type of cancer may behave in my body will be different from the way it may behave in yours. Every person experiences cancer and other life-threatening disorders in a different way, whether we're talking about our sense of mortality or assessing the effect of the disease on a molecular level.

It's in this molecular arena that Brookhaven Lab is exploring diagnostic and therapeutic effects of dual-purpose radionuclides, as well as radionuclide pairs of the same element, with emissions suitable for diagnostic imaging and therapy. For this treatment, we coined the term "*theragnostic*," not yet in the dictionary but now accepted and appearing in the medical literature.



Suresh C. Srivastava

Pinpoint Targeting of Cancer Calls

A radionuclide is an atom with an unstable nucleus. When these atoms decay, they emit radiation, which can effectively treat cancer and many other inflammatory disorders. Such a radionuclide (payload) is delivered directly to cancer in a patient's body by combining it with carrier molecules to form a radiochemical compound, what are called radiopharmaceuticals. These radiopharmaceuticals seek cancer or other diseased cells, while largely avoiding healthy cells.

As noted in my [May 2012 invited article](#) (pdf) in "Seminars in Nuclear Medicine", a theragnostic radionuclide or radionuclide pair could target the molecular level to allow low-dose diagnostic imaging prior to higher-dose therapy.

At Brookhaven, we've been pursuing this goal for more than two decades -- until about two years ago within the Radionuclide and Radiopharmaceutical Research Division in the Medical Department and now within the Medical Isotope Research and Production Program in the Collider-Accelerator Department. In the early 1980s, our work on a "dual-purpose" radionuclide, tin-117m, convinced us it's one of the most promising theragnostic radionuclides -- and we've continued to concentrate on this effort.

We're sorting out and organizing several theragnostic radionuclides and radionuclide pairs to help bring us a major step closer to the age-long dream of *personalized medicine* for performing specifically-tailored, low-dose molecular imaging using single-photon computed tomography (SPECT) scans or positron emission tomography (PET) scans. This would let us know the cancer's specific location, dose required for treatment, and other important therapeutic concerns, followed by higher-dose therapy in the same patient with the same radiopharmaceutical.

Looking to Avoid Chemotherapy's Side Effects

Chemotherapy is effective at killing tumor cells that are rapidly dividing, but it doesn't know the difference between cancerous and normal cells. The normal cells will grow back and be healthy, but, in the meantime, serious side effects occur. Perhaps chemotherapy kills 90 percent of the cancer cells but adversely affects 40 to 60 percent of the healthy cells.

Radionuclide therapy, in particular using theragnostic radionuclides, is the result of about 100 years of research dedicated to understanding the differences between cancer and normal cells. This information is used to create a targeted therapy to attack the cancer cells without damaging the normal cells, thus leading to fewer side effects.

Challenges and Collaborations

We do have obstacles to overcome. A major problem to be resolved is the lack of availability, in sufficient quantities, of a majority of the best candidate theragnostic radionuclides with high purity and high specific activity. Before we can realize this treatment in routine clinical practice, we must develop an increased and reliable availability -- at a reasonable cost -- of some of the best

theragnostic radionuclides.

Fortunately, this has been achieved in the case of tin-117m as a result of our 10-year collaborative research effort (1999-2009) between BNL and major research institutes in Russia, including the Institute of Nuclear Research, Moscow State University, and others, which has been supported by the Department of Energy/National Nuclear Security Administration Global Initiative for the Prevention of Proliferation Program.

Benefits for Cancer...and Beyond

If we are successful, medical practitioners -- and their patients -- will have treatments available to target certain types of cancer cells so well that it would be up to 90 percent effective against them, while only affecting about 10 percent or less of the healthy cells.

Cancer is not the only disease we would be better able to fight. Many other disorders that respond well to radionuclide therapy, for example cardiovascular disease (e.g., atherosclerotic plaques in coronary arteries, which are often fatal), might be more effectively treated.

Also, this type of treatment potentially allows healthcare provider systems to save money by identifying therapies not likely to be effective for particular patients, and researchers would have a better understanding of comparative effectiveness of different treatment options.

BNL is Well-Positioned for this Research

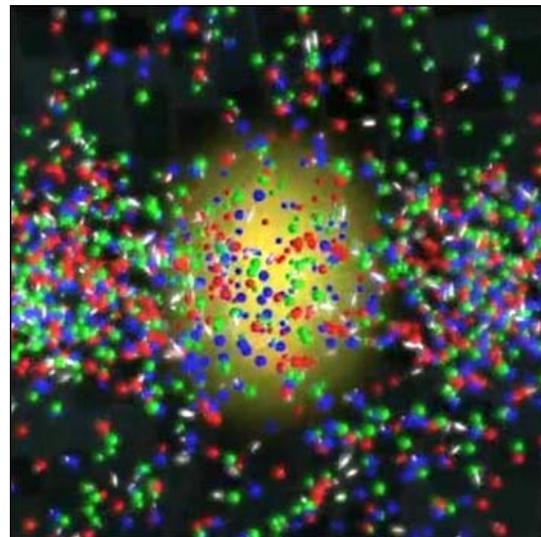
At Brookhaven Lab, we have had unique facilities, such as the Brookhaven Linac Isotope Producer (BLIP) with its unparalleled ability to provide a domestic supply of isotopes to the medical community, that allow us to do the research that's leading us toward this much sought solution. Brookhaven is the birthplace of nuclear medicine and the development and production of novel and/or difficult to produce radionuclides continues to be one of our major strengths.

By [Justin Eure](#) | June 26, 2012 **Brewing the World's Hottest Guinness**

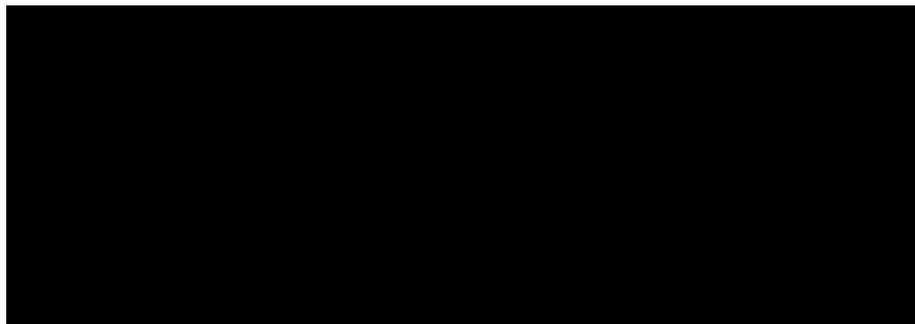
The positive and sometimes unexpected impact of particle physics is well documented, from physicists inventing the World Wide Web to engineering the technology underlying life-saving magnetic resonance imaging (MRI) devices. But sometimes the raw power of huge experiments and scientific ambition draw the recognition of those seeking only the most extreme achievements on Earth.

Brookhaven National Laboratory's [Relativistic Heavy Ion Collider](#) (RHIC) smashes particles together to recreate the incredible conditions that only [existed at the dawn of time](#) (video). The 2.4-mile underground atomic "racetrack" at RHIC produces fundamental insights about the laws underlying all visible matter. But along the way, its particles also smashed a world record.

Guinness World Records, no longer encumbered by "book of," recognized Brookhaven Lab for achieving the "[Highest Man-Made Temperature](#)." When RHIC collides gold ions at nearly the speed of light, the impact energy becomes so intense that the neutrons and protons inside the gold nuclei "melt," releasing fundamental quarks and gluons that then form a nearly friction-free primordial plasma that only existed in Nature about a millionth of one second after the Big Bang. RHIC discovered this primordial, liquid-like quark-gluon plasma and measured its temperature at around 4 trillion degrees Celsius – that's 250,000 times hotter than the center of the sun.



Protons, neutrons melt to produce 'quark-gluon plasma' at RHIC





“There are many cool things about this ultra-hot matter,” said physicist Steven Vigdor, who leads Brookhaven’s nuclear and particle physics program. “We expected to reach these temperatures – that is, after all, why RHIC was built – but we did not at all anticipate the nearly perfect liquid behavior.”

As it turns out, this surprising phenomenon occurs at both extremes of the temperature spectrum.

“Other physicists have now observed quite similar liquid behavior in trapped atom samples at temperatures near absolute zero, ten million trillion times colder than the quark-gluon plasma we create at RHIC,” Vigdor said. “This is just one among many unexpected connections we’ve found between RHIC physics and other scientific forefronts. The unity of physics is a beautiful thing!”

Speaking of unity in physics, a much larger collider is also probing quark-gluon plasma and generating sun-shaming temperatures. The 17-mile Large Hadron Collider (LHC) at Europe’s CERN laboratory smashes lead ions together in its own super-hot recreations of the Big Bang. And the LHC’s ALICE ([A Large Ion Collider Experiment](#)) may be positioned to trump RHIC’s record.

“The energy density at the LHC is a factor of three higher than at RHIC,” said CERN physicist Despina Hatzifotiadou. “This translates to a 30 percent increase in absolute temperature compared to the value achieved by RHIC. So I would say that ALICE has the record!”

But despite ALICE’s prowess, the collaboration has not published an official temperature measurement of its quark-gluon plasma, and the Guinness team is nothing if not official. For the time being, RHIC reigns, having driven physics forward by creating that revelatory multi-trillion degree matter many billions of times. But as with all records, RHIC’s Guinness is destined to be broken



Folks,

Once again, I'd like to thank everyone at C-AD for your continued support, donations and contributions that you so freely give to the Food Drive throughout the year. It means a lot to so many families.

If everyone can bring in at least one non-perishable food item, this would help the local food pantries in our area. There are so many families who are in need of food and depend on their local food pantry to have at least one meal a day. With the food supply so low, the volunteer's who help out at our local food pantries can't help those in need. So please.....bring whatever you can to replenish the food supply for those in need.

Your donation of any non-perishable food item can be left in the box marked "Food Drive" located in the 911A Lobby.

Your continued support is appreciated.

Thank you.

Anne Marie Luhrs



ALUMNI NEWS: AGS/RHIC/C-AD RETIRED CROWD - We'd enjoy hearing from you and what you have been up to. Please send your notes to pmanning@bnl.gov

You can catch up on all of Eric Forsyth's travels by clicking on his sailing yacht below.



July 2012

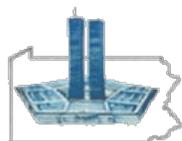
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4 Holiday 	5	6	7
8	9	10	11	12	13	14

15	16	17	18 C-AD Accelerator Physics Seminar, "Lengthening the Spin Coherence Time: A Progress Report from COSY", Edward Stephenson, Indiana U., 4pm, Bldg. 911B LCR	19	20 First of Ramadan	21
22 Parents' Day	23	24	25 Pianofest Noon Recital, Berkner BSA Distinguished Lecture, "A discovery! The Higgs? Why is this important? How it was done", Howard Gordon, Sally Dawson, Physics Dept., 4pm, Berkner	26	27	28
29	30	31				



August 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5 RHIC Summer Sunday	6	7 Physics Colloquium, "Photons at the LHC: from precision QCD to searches of new physics", David d'Enterria, CERN, 3:30pm, Bldg. 555 Hamilton	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



We Remember
Sept. 11, 2001

[USS New York](#) - A ship forged from the steel of the World Trade Center

Editor: [Pamela Manning](#) x4072