

# The Village Courier



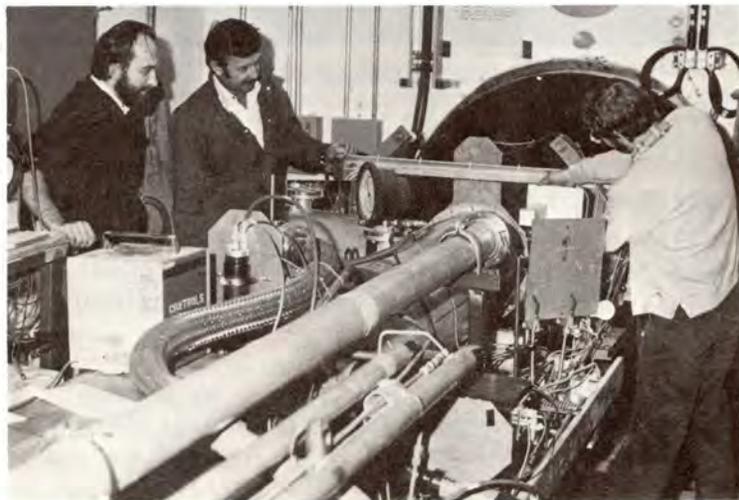
national accelerator laboratory

Operated by Universities Research Association Inc.  
Under Contract with the United States Atomic Energy Commission

Vol. 5 No. 4

January 25, 1973

## NAL'S NEUTRAK VALUABLE EXPERIMENTAL TOOL



*... (L-R) Ray Stefansky, Jack Lindberg, Don Carpenter adjusting target for neutrino experiment on the target train, just outside target tube. Beam passes through upper tube, strikes white object or adjoining screen...*



*... Steve Velen checking radioactivity level on a monopole experiment mounted on the Neutrino line's target train. TV camera monitors activity as beam passes through...*

The 700-ft. narrow gauge railroad located in a tunnel under Nuhall in NAL's Neutrino Line, carries a 28-ton load of freight known as the "target train." The target train serves the Neutrino Area in this way: As the proton beam comes down the neutrino line from the Main Ring, it collides with a target of 3/4" x 2" x 12" aluminum; the collision represents the first stage of production of neutrinos and muons, considered to be some of the most interesting, potentially-important sources of new knowledge about sub-atomic structure. This target and myriad pieces of other equipment are mounted on several platforms riding on wheels, coupled together to form an actual 200 ft. train. The precise, intricate apparatus arrangements are designed by the Neutrino Area staff and by experimenters to produce, control, and study the particles' activities.

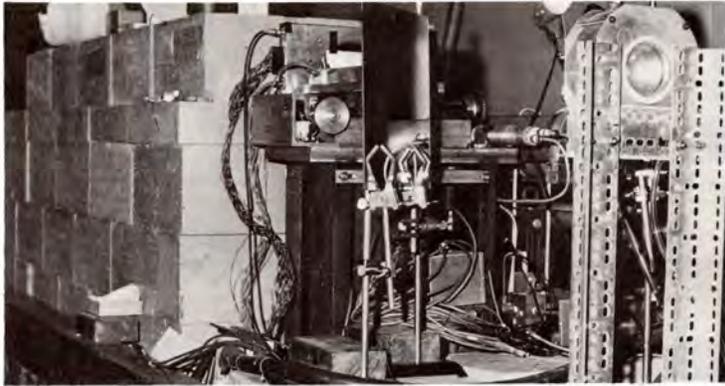
The target train itself is 200 feet long. In its working position it is inserted into the target tube, a circular underground enclosure just a little larger than the train and its load. During maintenance periods, the train is pulled back into the Target Hall where the larger quarters give the staff and experimenters access to all its parts.

The refurbishing of the train's load in January saw improvements, modifications, and new installations. "It was the passing of a phase, in a sense," says Tim Toohig who headed the project. "For example, we replaced the old main ring magnet we had been using as a beam dump on the train, with a properly-designed, water-cooled dump that can take the maximum intensity and energy the machine can produce."

"We also incorporated into two of the modules in the beam dump special traps for a monopole search experiment. And, we installed a target system for the muon and the narrow band neutrino experiment. In general, we increased the versatility of the neutrino line."

(Continued on Page 2)

NAL'S NEUTRAK (continued)



...First target on neutrino train...



...Neutrak "locomotive"...

(Photos by Tim Fielding, NAL)

The train will probably remain inside the tube until March, according to Toohig.

Work has also begun on construction of another extension to the Target Hall to permit the building of a second target train, giving the line double strength -- while one train is working in the tube, the other can be worked on in the new hall. The second train will be different from the first. It will include, for example, a strong focusing horn for neutrino experiments using the 15-foot Bubble Chamber.

Two experiments are presently set up and taking data in the Target Hall; four experiments are collecting data from equipment on the target train; three experiments are in operation in the 30" Bubble Chamber at the downstream end of the neutrino line. "We hope to run all of these simultaneously very soon," Toohig reports.

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ABOUT THAT NEW SOCIAL SECURITY RATE...

The most recent social security law revisions by Congress have resulted in an increase in the payroll tax rate for employees and employers from the 5.2 per cent on the first \$9,000 of tax wages in effect in 1972 to 5.85 per cent of earnings, up to a maximum of \$10,800, for 1973. These changes in the federal social security laws have been reflected in deductions from pay-checks since January 1, 1973.

The employee's contribution is matched by an equal contribution on his or her behalf by the employer.

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UNUSUAL CHESS MATCH HERE

NAL's Chess Club offers chess followers an opportunity to observe 12-14 simultaneous matches starting at 7 p.m. on Thursday evening, January 25 in The Village Barn. NAL's team will play an extra-curricular match with Bell Laboratory, the strongest team in this division of the Chicago Industrial Chess League.

Playing for NAL will be: John Nelson, W. Ganger, H. Pfeffer, R. Parry, M. Koenig, H. Paar, H. Howe, J. Falk, F. Johnson, all of the Accelerator Section; J. Stull, and R. Lepszy of the Machine Shop; D. Sutter, Internal Target and Al Algustyniak, Research Services.

!!!SPECTATORS ARE WELCOME!!!

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OPTIONAL BENEFITS DECISIONS DUE

NAL Personnel Department reminds employees eligible for the optional maternity benefits under the revised group insurance plan that they must send their decision to Personnel, immediately, on whether they wish to have this benefit included in their policy. Both YES and NO answers are necessary and should be sent to Mildred Meyer, Personnel, 21 Sauk - Ext. 3324.

New contract booklets incorporating the recent revisions will be distributed to all employees in February.

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### 1973 URA FELLOWSHIPS OPEN

The URA Fellowship program for 1973 has been announced by C.F. Marofske, NAL Personnel Manager. The URA fellowships are sponsored by Universities Research Association, Inc., parent body of NAL. The fellowship provides financial support to sons and daughters of URA and NAL employees entering college. Candidates for the fellowships must meet these conditions:

1. Only students entering their freshman year of college in 1973 are eligible.
2. Children of all NAL and URA employees are eligible.
3. Candidates must be enrolling at an accredited school in a scholastic program leading to a baccalaureate degree.

The fellowship provides a maximum of \$1200 toward tuition and fixed fees renewable on an academic calendar basis for four years. URA hopes to give seven awards this year.

A number of employees' children currently hold URA fellowships. Details of the fellowship program can be obtained by calling Mildred Meyer, Ext. 3324, Personnel.

*...The dinner dance sponsored by NALREC during the recent holidays gave over 400 NAL people a delightful evening together, thanks to Bob Kolar, chairman of the event. Plans call for the 1973 dance to be held again at St. Andrews Country Club in West Chicago...*

*Photos courtesy Tony Frelo, I-Hung Chiang*



(First of a series to be published in The Village Crier)

## AN INTRODUCTION TO THE NATIONAL ACCELERATOR LABORATORY

### Part I. U.S. Accepts Challenge Offered by High Energy Physics

The zeal for exploring the unknown runs deep in American tradition. The discovery of the American continent was itself the result of this kind of challenge. And the development of the United States in the past 200 years is but an extension of the zest for one discovery after another, be it geographical, political, economic, scientific, or sociological. As individuals, and in all facets of the social structures which they support, Americans continually feel the need to go forward with a purpose.

With geographical frontiers of the United States fully explored, Americans have looked for other directions to move which will yield the same sense of achievement as did the development period of the country. The ventures to the moon have given one dimension to absorb this restless energy. The discoveries and new knowledge accomplished by these trips are finding their way into the total storehouse of knowledge. The feeling of the American public looking at the moon missions is one of pride, of satisfaction for a job well done, and one of excitement for the new vistas uncovered by fellow citizens.

A venture equal in scientific importance to the moon explorations is beginning at the National Accelerator Laboratory, where the newest tool for the study of the atom is now operating. The vehicle for the NAL mission -- the world's largest proton accelerator -- is for the most part permanently hidden under the ground; it is essentially silent. On the surface, it gives no clue to the curious universe it is exploring. But it is here that men and women will be looking to the internal depths of matter in the same reciprocal distances that the largest telescopes look outward into space. In both cases, the discoveries are of vast importance to the future of all men.

The possibility of construction of the NAL accelerator became a reality in 1965 when high energy physicists in the United States surveyed the status of their field in an extensive hearing before the Joint Committee on Atomic Energy of the 89th Congress of the United States. The Joint Committee consists of nine Members of the U.S. Senate and nine Members from the House of Representatives. (No more than five from each body can be members of the same political party; the chairmanship alternates between the Senate and the House of Representatives with each Congress.) The Joint Committee represents the Congress and the American public, seeking to assure the implementation of the national policy expressed in the Atomic Energy Act of 1954.

The consensus of the testimony at the 1965 hearing was that great progress had been made in exploring the heart of the atom by applying high energies and that more could be expected. It was unanimously agreed, however, that just over the horizon is an enormous untouched area of knowledge that could be reached with equipment that could now be contemplated.

The Joint Committee established "A Policy for National Action in the Field of High Energy Physics." Among the eleven planning guides for national action set by the committee for the field were three profound observations:

*"It is in the national interest to support vigorous advancement of high energy physics as a fundamental field of science."*

*"New accelerators should be constructed only to provide significant*



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*extension of parameters of a new order of scientific capability."*

*"In view of the high costs of new very high energy accelerators, opportunities for international cooperation in accelerator construction and use should be actively explored."*

The Joint Committee, representing the people of the United States, had assessed the progress of the pioneering growth of high energy physics in the U.S., and had given a "Go Ahead" that was to signal the opening of a new frontier in American and world physics.

The Committee recommended, in its February 1965 report, the construction of a 200 BeV accelerator and design studies toward a future national accelerator in the range of 600-1,000 BeV.

In April of 1965, acting under the mandate of the Joint Committee, the Atomic Energy Commission announced that it was seeking a site for the new "atom smasher." Forty-six states submitted proposals for a total of about 200 locations to the AEC. A committee of the National Academy of Sciences evaluated the proposed sites and eventually, in December of 1966, the Midwestern site at Weston, Illinois was chosen because it demonstrated the availability of adequate power resources; proximity to five universities and a major airport; abundant water supply; available land, and no apparent danger of earthquakes.

Meanwhile, in June of 1965, a nonprofit corporation named the Universities Research Association, was formed to administer the development of the new facility. Thirty-four universities joined this body originally (it is now composed of 52), and the representatives of these institutions have guided the development of the Laboratory under a contract with the Atomic Energy Commission.

With the NAL machine now in operation, it is well to recall the mission proposed by the Joint Committee. The NAL machine has already performed at more than double the energy of its original design. International cooperation is already a reality in experiments underway. Results of experiments carried out on the NAL accelerator have been published. The NAL staff stands at the threshold envisaged in the NAL Design Report:

*"In previous studies of the nucleus, physicists were able to understand why the stars shine and how matter is made. Today, a new mechanism for an intense release of energy is part of current theoretical conjectures about the possible formation of protons and neutrons from some still more fundamental particles, called quarks. The probability is small that an understanding of the mysteriously dense energy source of the quasars can be explained in terms of quarks, but it is almost certain that other phenomena almost as interesting will be related by an eventual understanding of the nature of fundamental particles."*

*"This is not to imply that benefits will be forthcoming from this study that are the equivalent of those that came from previous nuclear research. Nevertheless, pure science, the search for understanding, is as important for its effect on the minds of men as it is for its eventual contributions to his standard of living. Man's effort to achieve a better comprehension of the world in which he lives will continue to have a profound effect not only on his philosophy, not only on his well-being, but also on his whole social organization."*



An aerial view of the National Accelerator Laboratory in 1972

NALWO CALENDAR

- Friday, January 26 - Theater Party - dinner at El Adobe, 29W 012 Butterfield Rd., 6 p.m. Those who wish to attend "A Taste of Honey" at the Albright Theater, Warrenville, at 8:15 p.m., call Mary Lou Satti, 355-4430 for reservations.
- Saturday, February 10 - Gourmet group - Russian dinner - 7:30 p.m. Call Mary Otavka (969-6199) by January 30 for recipes and reservations.
- Wednesday, February 14 - Tea for international visitors, 1 p.m., Village Barn. Babysitting available, White Farm, 75¢ per child.
- Tuesday, February 20 - General housecleaning, White Farm.
- Friday, February 23 - Newcomers Pot Luck, 5:30 p.m., Village Cafeteria. Call Ellen Ljung, 231-8513 for further information.

IT'S YOUR CHOICE...

Hockey - Wednesday, February 21, 1973, Chicago Blackhawks against the Montreal Canadians. A bus will leave Shakey's Pizza Parlor at 6:00 p.m., SHARP, and will return about 11 p.m. The \$11.50 ticket includes admission, a pizza, beer and soft drinks on the bus, and bus fare. Call Peaches, Ext. 3470 for further information.

Musical Comedy - "No, No, Nanette" - Tickets are on sale at NAL for this delightful program at the Shubert Theatre in Chicago on Friday, February 2, at \$9.00 each. Call Marilyn Paul, Ext. 3454 for tickets and further information.

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The Duplicate Bridge Club will meet Thursday, January 25, 1973 in the lounge of the Village Barn at 8:15 p.m., with a brush-up session starting at 7:30 p.m. Winners on January 11 were Hank and Bea Hinterberger in first place, with the O'Mearas and the Warners in second and third, respectively.

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FAMILY SKATING PARTY

Saturday, January 27 - Phillips Pond, 1-4:00 p.m., hot chocolate, marshmallows and donuts will be served. DON'T MISS THE FUN! (Call NAL Switchboard after 10 a.m. on January 27 if there is any doubt about the party being held because of the weather that day.)

CLASSIFIED ADS

FOR SALE - Kodak automatic slide projector-Carousal-760H w/synchronized tape recorder-\$125; Used tennis racket-\$5; used golf clubs, 1 & 3 woods, 3-5-7-9 irons, putter & bag-\$10; size 8½ hockey skates-\$10. Call Michael W. Morgan, Ext. 3791 or 448-1838.

FOR SALE - 1965 Chevy Carryall, 300 h.p., 317 c.i., corvette engine, stereo FM & tape, carpeted, good tires/brakes/clutch/shocks, etc., \$700. Call Ken Guise, Ext. 3701 or 246-0907.

FOR SALE - 1964 Ford, 390 eng., new transm., radio & heater-\$250 firm. Call Ken Fleisher, Ext. 3555

FOR SALE - 1968 Mustang V8-302 engine, auto/transm., p/s, low mileage, \$950. Call Gerald Jones, Ext. 3275 or 697-4537.

FOR SALE - Size 7-8 Wedding Gown w/pearl applique & lace, detachable train and veil. Best offer. Call after 6 p.m. William Beckley, 892-6326.

WILL BABYSIT - Full or part-time during the day in my home (Warrenville), any age child. Call Netty Paar, 393-1062.

FOR RENT - 2/bdrm. apt., carpt/dishwasher/stove/refrig/garbage-disposal/2 air-cond., balcony. You pay electricity. Avail. March 1 - Wheaton. Call R. Crouch, Ext. 3776 or 653-4556.

WANTED - Will alternate rides (occasionally or regularly) to Lab from Union and 6th St., Aurora. Call Kyu Lee, Ext. 3205 or 851-6080.

WANTED - Will buy old & junk guns or parts for student gunsmith. Call Bonnavent Paul, Ext. 3575 or 357-2372.

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