

# the Bulletin Board

VOLUME 14 - NUMBER 2

Published by the BNL Personnel Office

SEPTEMBER 13, 1960

## RESERVE SEMINAR BEGINS

The Naval Nuclear Science Seminar started this past Monday with a welcome to the Laboratory by Dr. Tape and an address to the Reserve by Admiral Wellborn, Commandant of the Third Naval District. These opening remarks were followed by a description given by Dr. Fred Cowan, head of the Health Physics, of the material to be covered during the ensuing two weeks. The nuclear Science Seminar, which concerns basic health physics, is being attended by approximately 40 Naval, Army, and Air Force officers, and will continue at Brookhaven through the 24th of September.

## ALL VEHICLE DRIVERS

About 450 BNL employees and guests are holders of U.S. Government Motor Vehicle Operator's Identification Cards which will expire this month. Check yours.

Also check your state operator's or chauffeur's license. This too may expire at the same time.

Upon renewal of your state license, your Government permit must also be renewed, if you are to drive a Government vehicle. You are not permitted to drive a Government vehicle unless you have a valid permit.

Renewal forms for the Government permit are being distributed via inter-office mail. If you do not receive your form, contact the Security Office, X-2392.

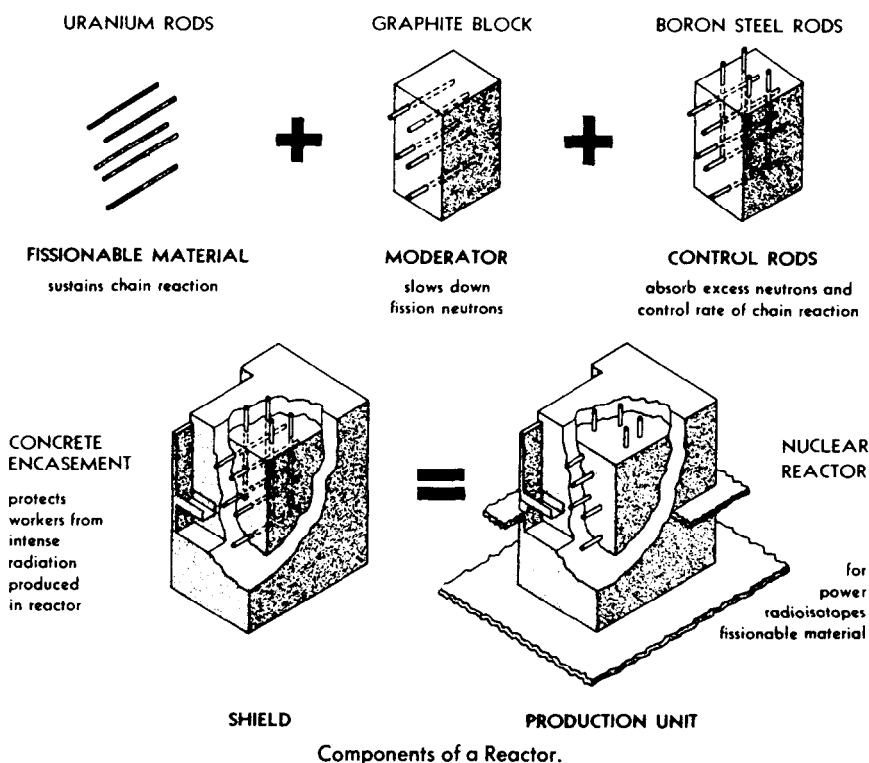
## RECREATION OFFICE CLOSED

The Recreation Office will be closed beginning Tuesday, September 6, through Friday, September 16. For recreation information, contact R. Vogt at the Personnel Office, 58 Brookhaven Avenue, Ext. 2107.

## POOL, GYM CLOSED

The swimming pool and the gymnasium have completed their summer schedules. Both facilities will be closed during the month of September. Announcements of future schedules will be made in THE BULLETIN BOARD for the fall season.

## NUCLEAR REACTORS



Nuclear reactors are highly important tools in research into the nature and structure of matter for the physicist, chemist and biologist. Reactors are also making a significant contribution to man's search for new sources of energy. Since the world's first nuclear reactor was built under the stands of the stadium of the University of Chicago in December 1942, nuclear reactor design has advanced tremendously and many reactors have been constructed, but it was not until the end of World War II that the design of more advanced reactor designs was initiated.

The operation of nuclear reactors and the detonation of nuclear weapons are both based on the fission process. This process, the splitting of a heavy nucleus into two or more lighter nuclei or particles, can result in the release of large amounts of energy. A fortunate consequence of the fission of certain nuclei is that the process releases neutrons, the particles used to trigger the fission process initially. These neutrons may in turn cause the fission of other nuclei, resulting in a "chain reaction."

In a well-designed weapon, the energy from the fission process is released in as short a time as possible to allow the maximum amount of total energy release before dispersion of the core stops the reaction. In a reactor, the problem is to keep the reaction intimately under control at all times, releasing the energy at an accurately determined and carefully controlled rate. The difference between the release of energy in a nuclear weapon and in a reactor can be compared to the difference between the chemical reactions in the detonation of high explosives and in the burning of coal.

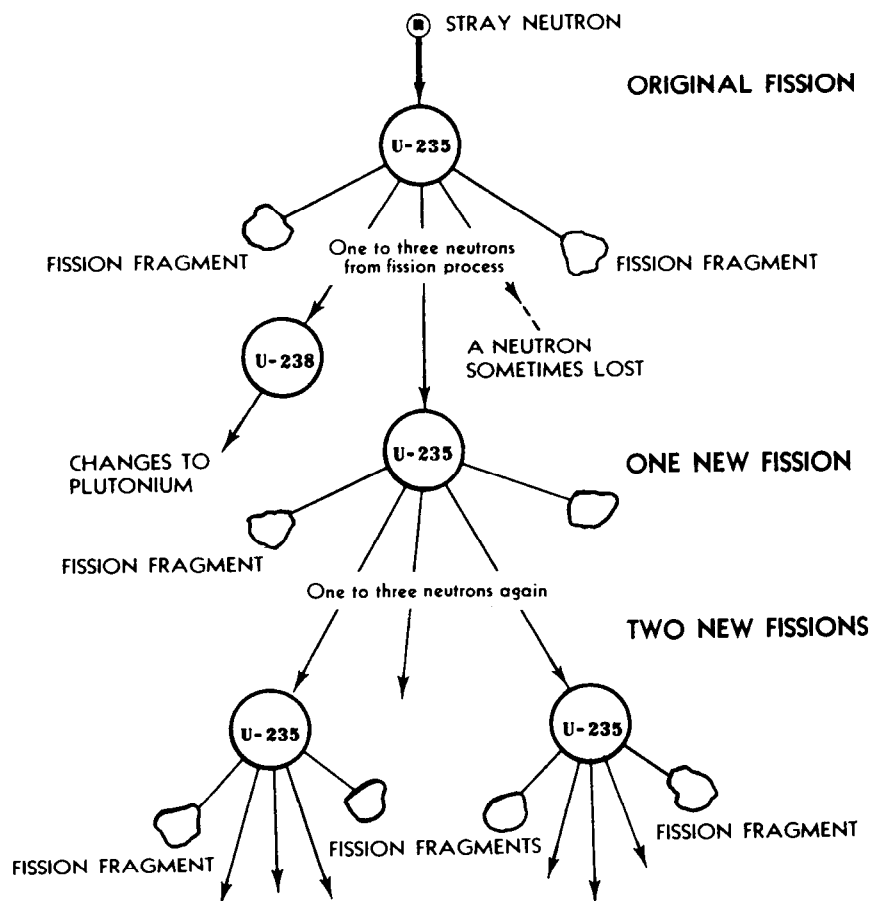
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**NUCLEAR REACTORS—Cont'd**

Natural uranium was the first fuel used in nuclear reactors. In natural uranium three different isotopes (atoms with the same number of protons but different numbers of neutrons) of the element occur. Of these, only one,  $U^{235}$ , is readily fissionable in a reactor and it comprises only a small fraction of naturally occurring uranium. Thus the use of natural uranium (in the ratio of 1 to 140) involves large weight and size of reactor cores (the region in which fission takes place), since a large proportion of the fuel element is useless in the fission process.

At present both reactors at BNL use highly enriched uranium as a fuel. In this fuel, the ratio of  $U^{235}$  atoms to other isotopes of uranium has been greatly increased, thus reducing the size of the core for a given number of fissions. Although the cost of enriched uranium is much higher than that of natural uranium, it is more satisfactory for use since it allows more efficient operation of the reactors.

The core of a nuclear reactor is made up of three types of materials; fuel, moderator and poisons. The fuel is the isotope  $U^{235}$  for example, which undergoes fission.



The diagram above shows what happens in a chain reaction resulting from the fission of one uranium atom.

The purpose of the moderator is explained by the fact that the most likely neutron for causing fission in  $U^{235}$  is one which possesses energy of about the same magnitude as the energy of gas molecules at room temperature and atmospheric pressure. A neutron having this approximate amount of energy is called a thermal neutron. However, the neutrons emitted from the nucleus have energies much higher than this. They must be slowed down, or moderated, to increase their effectiveness.

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**WEEKLY SAFETY HINT**

W.G. Becker, Ground Maintenance Group Leader, who also serves as Safety Coordinator, advises, "All Grounds Maintenance employees are required to wear safety shoes and safety glasses when operating rotary lawn mowers — a precaution you could adopt for your home grass cutting." (Safety glasses and safety shoes for home use may be purchased through T-100)

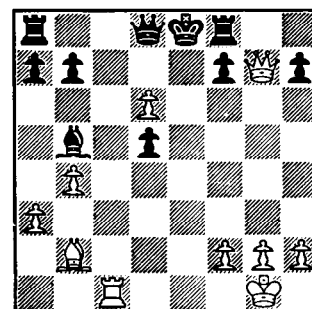
**UPTON RIFLE AND PISTOL CLUB**

Sunday, Sept. 18th, at 2 PM will be the time for the next battle between the Wyatt V.R.P.S. vs Mid-Island Rifle and Pistol Club at our own on-site range. The standard 25 yd. N.R.A. course will be used for .22 cal. pistols only.

Also on Sept. 20th, at 5 PM, the last D.C.M. pistol course will be fired. Those individuals who enjoy free shooting, free ammo at free targets and also qualifying for D.C.M. awards, don't forget to attend.

**CHESS PROBLEM**

Membership dues for the BNL Chess Club are due in September. If you have not paid it as yet, you can do so at our next regular meeting. In this week's problem, it is white's move and win.



White to move

## DIVERS BELOW

During the past summer, a hearty group of adventurous divers have ranged from Block Island to Long Island's north and south shores. They have explored wrecks, speared fish and recovered objects ranging from lost sails to drowning victims. They are the members of the Brookhaven Divers Club.



The Divers Club began as an informal group of diving enthusiasts in 1958, and early in 1959 a formal club was formed under BERA. Since then the club has been under BERA. Since then the club has come a long way. During the past summer months members have been diving every week in many interesting places. Block Island was visited aboard the 47 ft. charter boat, Lucky Jac (see picture above), and numerous dives have been made in Fire Island inlet, on wrecks off Long Island's south shore and along Long Island's rocky northern coast.

On the most recent dive to Fire Island the members chartered a boat and although diving in the ocean was impossible, they were able to capture several rarely seen small marine tropical fish in the inlet. These brilliantly colored little fish now reside in one member's marine aquarium.

During the coming winter months, the club will use the Brookhaven pool for testing equipment and diving to keep in shape. Highlight of the winter season will be the class given by the Divers Club to all those interested in diving. The instructions will range from snorkel diving to advanced aqua lung diving. The course will be open to all Brookhaven employees and their immediate families.

In the Divers Club Headquarters, located in the Recreation Building on York Lane, can be found much of the club's equipment; complete charts of Long Island waters; a small reference library of diving books; underwater apparatus, such as marker buoys, etc.; and the club's inflatable raft. A collection of photo's of current dives decorate the walls.

If you are a diving enthusiast, or interested in learning the sport of diving,

## NUCLEAR REACTORS—Cont'd

The moderator slows down the neutrons by causing them to collide with atoms of the moderator material. In these collisions, the neutrons give up their energy, in the same way a bowling ball gives up its energy to the next ball on the rack as it strikes the stationary ball. The maximum transfer of energy (hence the greatest slowing-down of the striking particle) occurs if the masses of the striking and struck particles are equal. Since the neutron, the striking particle, has a mass approximately equal to that of a proton, elements with the smallest number of neutrons and protons in the nucleus and hence the smallest nuclei would seem to be the best moderators. Since however, any material introduced into the core is a potential absorber of neutrons, good moderator materials should also have a small likelihood of absorbing neutrons. Most reactors today use water, heavy water, or carbon in the form of graphite as a moderator.

Poisons are the materials present in the core which tend to absorb neutrons, removing them from the neutron cycle, or "poisoning" the reactor. Most poisons, although present for very practical reasons, must be considered as undesirable insofar as the chain reaction is concerned. The only really desirable poisons are the control rods, or variable poisons. These are composed of materials rich in elements exhibiting good neutron-absorbing characteristics; e.g., boron or cadmium. The control rods are inserted or withdrawn from the core as the effect of other poisons varies, assuring continuous control over the fission reaction.

Once these three components: fuel, moderator and control rods have been brought together in a suitable arrangement, the operation of the reactor depends only on the number of neutrons available to produce fission. In other words, once we start to withdraw the control rods from the core, a neutron from any source, perhaps a spontaneous fission, will start a chain reaction. The more the control rods are withdrawn, the more neutrons are available to produce fission, and the faster the energy release occurs.

When the control rods are inserted, they absorb neutrons, making fewer neutrons available to produce fission, and reducing the energy released.

Practically all the energy released by fission is eventually transformed into heat in the core. The average energy released per fission is constant for a given fuel. The energy released per unit time, or the "power level" at which the reactor is operating, is directly proportional to the number of fissions per unit time, or the fission rate. For a particular arrangement of the core, the fission rate, and thus the power level, are directly proportional to the density of neutrons in the fuel.

Reactors have been extremely valuable tools in research in recent years, and they will continue to play an important role in nuclear research. Subsequent articles in the Bulletin Board will describe the BNL Graphite Research Reactor in detail.

### Advice

Keep your eye on the ball,  
Your shoulder to the wheel,  
And your ear to the ground —  
OK? . . . Now try to work in that position.

why not make it a point to attend the club's next monthly meeting and get all the information. Usually interesting movies on diving are shown after the business meetings. Stop around and meet the members. Watch for the next meeting date in the BULLETIN BOARD.

### BNL SAFETY RECORD

11 DISABLING INJURIES at BNL thus far in 1960 (for a rate of 3.33 injuries per 1,000,000 manhours - compared to the AEC Research Contractor rate of 1.58)

### ANSWER TO CHESS PROBLEM

	WHITE	BLACK
1.	Q - K5 check	K - Q2
2.	R - B7 check	Q x R
3.	Q - K7 check and mate next.	

# SHOP YOUR CLASSIFIED ADS

## BULLETIN BOARD

### CLASSIFIED AD POLICY

1. Employees only may place ads in THE BULLETIN BOARD.
2. All items advertised for sale must be the property of an employee.
3. Real estate ads will be accepted only when they involve change of residence by an employee.
4. No ads for business purposes will be accepted.
5. Ads must be submitted in writing (preferably typed) by 3 p.m. Friday for inclusion in the next week's newspaper. Address the ads to THE BULLETIN BOARD, 58 Brookhaven Avenue, or deliver them to the Personnel Office. Ads must contain a signature and Laboratory telephone extension. If you do not want your name to appear when the ad is printed, put it in parentheses.
6. Ads are run on a space available basis. If your ad does not appear due to space reasons, it will be held for inclusion in the next issue of THE BULLETIN BOARD.
7. If you wish to repeat an ad, it must be re-submitted.

### FOR SALE

1959 RENAULT DAUPHINE - heater, windshield washers, 11,000 mi., blue excl. cond., \$300 down and you take over low payments. Call Atlantic 6-8224 after 5:30. J. Backes, Ext. 2341.

1942 CADILLAC - Model 62, 4-dr. sedan, hydromatic, 50,000 org. mi., good tires and paint. Interior in excl. cond., engine and body need minor repair. Car is in running cond. Will sell to highest bidder. Atlantic 6-8206.

1953 FORD - V-8, customline with overdrive, new clutch, other work. Excl. cond. Owner leaving country. \$300. F. Anderson, Ext. 324 or 728.

1952 HILLMAN - 4-dr. sedan, in good cond., dependable second car, has had recent work, 32mpg. Price \$225. Firm. John Walsh, Ext. 454.

1951 DODGE - 4-dr. sedan, green, good running cond., clean, \$100. Ext. 451, or after 6:00 PM, GRover 5-7582.

19-FT SAILBOAT - Lightning class. In water. Good cond. R.C. Krueger, Ext. 301-69 or BELLport 7-0693J.

30-FT YAWL - new, Aux. eng., dacron sails and stainless steel rigging. Sleeps 6 in 3 separate compartments, encl. head, dining area. Very roomy and fast. Trade for smaller boat or sell for \$7750 (lists at \$9800). Ext. 2325 or PO-8-3371J.

16-FT OUTBOARD BOAT - 1958 Cruisers Inc., 35 hp Johnson Electric, \$1095. Ext. 2201.

18-FT COMMODORE SEA SKIFF - with 40 hp Johnson Electric, lapstrake, navy top & side curtains, cushions. 1960 boat, \$2000. JUniper 1-7582, 9:00 AM, 12:00 noon.

18 FT DORY SKIFF - 25 hp Kermath \$350. Ext. 2255.

18 FT SAILING CANOE - "Old Towne," excl. cond., sail, paddles, extra seats and complete sailing equipment, \$125. Gilzinger, Ext. 481.

2 FIRESTONE TOWN & COUNTRY SNOW-TIRES - tubeless type, 4 ply, size 6.70-15, used two months, \$15 each sold singly or 2 for \$25. Also 1 MOBILE SUPER TRACTION SNOW-TIRE - tube type, 4 ply, size 6.70-15, \$7. These are not re-caps. R. Walton, Ext. 2181.

2 LIVING ROOM CHAIRS - excl. cond. Ext. 2106 or after 5:30 call Atlantic 6-8476.

ELEC. FLOOR WASHER AND WAXER - like new. First come first served. \$20. Ext. 589 or after 5:30 call Atlantic 1-9269.

42" WESTERN-HOLLY GAS RANGE - 4 burners, griddle, 3 ovens (bake, broil, barbecue), storage drawer. Originally over \$400, asking \$98. Reed, Ext. 2204.

STEELMAN — FULL STEREO — HI-FI PORTABLE - 1960 model, 3 months old-never-used. Paid \$90. Asking \$75. Call Ext. 635, or AT - 8253.

ESPEY AM-FM TUNER AND AMPLIFIER - good cond., needs cabinet, best offer. 19" RCA 630 CHASSIS - with or without monster size cabinet, needs work, \$10 if picked up. Sadofsky, Ext. 354.

### FOR RENT

FURNISHED APARTMENT - or housekeeping rooms. 9 miles from Laboratory. Ext. 323 or Atlantic 1-6237.

4-ROOM APARTMENT - Bellport, near Village, all utilities, private entrance, garage, lease, \$100/mo. Atlantic 6-8850 evenings or Ext. 2463.

3 ROOMS AND BATH - furnished, refig. and Elec. stove, utilities incl. \$90/mo. Atlantic 1-7666.

### WANTED

COMMUNICATION RECEIVER - in good cond. Call. R. Spinrad, Ext. 542.

ASSISTANCE - of boat and equipment on North Shore to look for sunken boat. Call J. Henkel, Ext. 2116.

HOME FOR TWO KITTENS - 7 weeks old, both male, one black, one yellow and brown tiger. We will gladly part with either or both. Call Vise, Ext. 467, or BELLport 7-0349J.

SAILBOAT - between 20-25 ft, cond. not important — with centerboard, H. Houcsager, Ext. 2430 or GRover 5-0732.

PROSPECTIVE SAILORS IN BELLPORT AREA - to build Blue Jays in spare time for recreation. If interested, contact B.M. Lomonosoff, (BELLport 7-0290 after 5:00) for details.

### CAR POOLS

Would like to form or join car pool or take riders from Bay Shore area. Fred Kuehl, Ext. 2314.

Rider wanted to Hartford, Conn., Thurs., Sept. 15. Call Chong Lew, Ext. 2270.

Would like a steady ride from South Country Road, Brookhaven. P. Corey, Ext. 583.

Driver badly needed. Can be picked up on Sunrise Highway, opposite new Bennett Store, left off on Sunrise. Elliott, Ext. 2281.

2-man car pool desired from Miller Place (3 blocks north of Rte 25A). Augensine, Ext. 2324.