

## Plugging In Italy

Roberto Pagani has spent four months at BNL studying his native Italy. As a visiting researcher, Pagani has been doing energy systems research at the National Center for Analysis of Energy Systems (NCAES).

Using NSAES computer models, Pagani has developed a Reference Energy System (RES) for Sardinia and is just completing one for all of Italy.

The original concept of a Reference Energy System was developed in 1972 by Kenneth Hoffman and Philip Palmedo at Brookhaven. It is a network representation of energy flow in the United States energy system. Walter Sevian later computerized it so it would account for environmental impacts.

In general, this is how an RES computer model works: energy demand data from a well-documented reference year are entered, assumptions about the future are made, and the computer extrapolates the energy supply needed to meet future energy demand.

For Sardinia, Pagani used one of a series of computer models developed by Sevian, MEERA. Beginning with official Italian data for energy demand in 1971, Pagani identified major demand sectors such as residential, commercial, industrial, agricultural and transportation. Then he made assumptions about future energy demand, energy supply, technology development, population, gross regional product and per capita income.

Associated with each process of energy supply and demand is an estimate of the efficiency of various forms of energy conversion. For example, in a coal power plant that produces electricity, if one million Btu's of coal are fed into the plant, only about 300 thousand Btu's of electricity are produced. Coal power plants are about 30% efficient. Energy is lost in converting coal to electricity.

The model also enabled Pagani to analyze environmental impacts such as depletion of primary resources, emission of particulates and sulfur dioxide, and extent of land use.

"The real work is in developing realistic assumptions about the future and in putting the data into a form that fits the model's framework," said Pagani.



Roberto Pagani

He thinks that Sardinia was ideal for his first experience in developing a Reference Energy System. Sardinia is an Italian island in the Mediterranean Sea, about 150 miles west of the Italian coast. It is small and self contained, so energy input and output are easy to identify and quantify.

Currently, Pagani is working on a Reference Energy System for all of Italy, using another computer model called LDC-ESNS, adapted by Robert Malone and Ann Reisman from the original ESNS model developed by Sevian. He has completed a short-term energy scenario, with a base year of 1972 and assumptions made for 1980. Pagani points out that short term projections have a greater probability of coming closer to what actually happens. Over a long period of time, a system can undergo continuous change and unforeseen events can occur, which can invalidate the original assumptions.

Pagani stresses that his Reference En-  
(Continued on page 2)

## Bnl Lecture

### An Energy Primer

The BNL In-Service Institute on Energy for secondary level teachers of science and mathematics in Nassau and Suffolk counties was initiated in the 1972-73 academic year. In these eight-month-long Institutes, the participants not only review scientific principles concerning energy, but achieve a greater understanding of the nature of our energy problems, including the scientific, technical, environmental, social, institutional and economic factors associated with energy conversion, use, and conservation.

On November 14, Donald Metz who has been Director of the Institute since 1974, will discuss Brookhaven's long standing program in this area in a BNL Lecture entitled "Energy Future: A Primer for Secondary School Teachers." The lecture is scheduled for 8 p.m. in Berkner Hall.

The Laboratory's involvement with local secondary schools goes back to 1958. In that year, several staff members gave a course in physics to a group of high school teachers which was funded by New York State and sponsored by Hofstra College. For a number of succeeding years, a series of single discipline In-Service Institutes were conducted at the Laboratory under the auspices of the National Science Foundation. In 1972, an Institute was designed to explore the subject of energy from the independent, but complementary, viewpoints of physics, biology and engineering.

The basic format of the Institutes on Energy has remained essentially fixed at 30, three-hour Monday evening sessions. Approximately half the time is devoted to a lecture by a BNL staff member, the remainder of the evening is devoted to discussions by small groups, each group being provided an advisor who is a BNL staff member. Tours of Laboratory facilities are also arranged.

In trying to measure the effectiveness of the program, Metz notes that participant interest has remained high. Although only 35 candidates can be accepted, this year approximately 100 applied to the program. Expressions of appreciation are received from both school administrators and teachers. The latter recount how they are using, or plan to use, what they have learned in their classes. The National Science Foundation continues to support the program. In the last three years, BNL has been given a rating in the priority category and is the only non-degree granting institution to be funded.

Over the years, 80 BNL staff members have been involved in this activity and, according to Metz, they feel they are performing a service to the community. "By working with and through selected groups of secondary level school teachers a much larger segment of the community is affected," he says, "a particularly impressionable and effective segment of the community at that."

"In the final analysis," says Metz, "most participating staff members feel that the offering of these Institutes on Energy is a worthwhile endeavor, and we are constantly seeking ways of being more effec-



Don Metz

tive." He extends an open invitation to other BNL staffers to drop into the North Room of the Brookhaven Center on any Monday evening between 7 and 10 p.m. "You, too, might want to participate next year!" he says.

Donald Metz heads the Chemical Sciences Division of DEE. In this post, he spends full time administering the research conducted in his division for DOE's Basic Energy Sciences Division. Metz is a chemist by profession and came to Brookhaven in 1954 as an Associate Chemist in the then Nuclear Engineering Department. Before assuming his present administrative responsibilities in 1974, his research interests centered on polymers, polymerization, and radiation chemistry. He holds a Ph.D. in physical chemistry from the Polytechnic Institute of Brooklyn (now PINY). Metz has had a long association with St. Francis College in Brooklyn, he was a member of the faculty from 1947 until he joined the Laboratory, and continued as a Professor of Chemistry (part-time) until 1976. He is a Fellow of the American Institute of Chemists and at the Laboratory has served on the BNL Council, the Brookhaven Lecture Committee, the Semester Student Steering Committee and the Laboratory Safety Committee.

A buffet supper is served at 6:30 p.m. at the Brookhaven Center before the lecture. Many find it convenient and it is a pleasant way to meet members of other departments. Reservations for the buffet should be made in advance by calling Ext. 3541 before 5 p.m. on the day of the lecture.

## Goldhaber Elected

Maurice Goldhaber, AUI Distinguished Scientist, has been elected Vice President Elect of The American Physical Society. He will assume this office on January 25, 1980. The following year, Dr. Goldhaber will be Vice President and in 1982 he will become President of the Society. In the election, which was by ballot of the membership, Goldhaber was running against Walter Kohn, Director of the National Institute of Theoretical Physics, Santa Barbara, Calif.

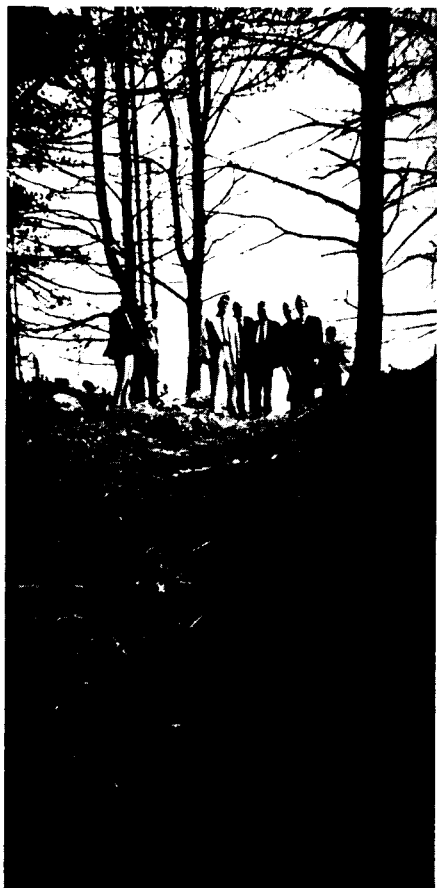
## Payroll Leads The Way

The first pledge cards received in Payroll for the United Way were from - Payroll! But others followed fast. In one week, we have reached almost a third of last year's total participation. So take those pledge cards out of your desk drawer and send them to your Department/Division coordinator. Your contribution may be in the form of a weekly or monthly payroll deduction. If you prefer, a one-time contribution will also be gratefully received. In the latter case, your check or cash should accompany the pledge card.

— photos by Humphrey



## Camp Upton Revisited



Representatives of two veterans' organizations visited the Lab recently to inspect the remains of army training trenches built here almost 30 years before Brookhaven was established. The trenches, located at what is now the ISABELLE site, were built by soldiers at Camp Upton during World War I, as part of their combat training for trench warfare in Europe. Although some trenches have been impacted by ISABELLE's construction, others located near the construction area have been identified and marked for preservation. During their visit, the veterans were briefed by BNL Associate Director Vincent O'Leary and DOE ISABELLE project Director Vern Witherhill. Paul Mohn, Deputy Head of the ISABELLE Construction Division, then took the group to the site to view existing trenches. Representing the Veterans of World War One, Patchogue Barracks No. 2981, were Commander Raymond Burns and Adjutant Marion Pond (who is also Historian of the American Legion's Hand-Aldrich Post). Representing the American Legion were County Commander Charles Read Sr. and Americanism Chairman Thomas Eltman, both of the Suffolk County American Legion, and Commander John Dekas of Hand-Aldrich Post No. 924 in Hampton Bays.

—photo by Humphrey

## New York Train Trip

The Hospitality Committee is planning a group railroad trip to the city on Wednesday, November 21. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is \$2.45, children under six years ride free.

Reserve a ticket by sending your fare through the U.S. mail to P.O. Box 322, Upton, New York 11973, no later than Thursday, November 15. Make checks payable to "Brookhaven National Laboratory." Your tickets will be given to you on the train. Refunds will be made only if cancellations are received by the Friday preceding the scheduled trip.

## SUNY Registration

Advance registration for the SUNY at Stony Brook spring 1980 semester for part-time matriculated and non-matriculated students will be held on Tuesday, November 13, 1979 between 10:00-12:00 noon in the Oceanographic Division Seminar Room, Bldg. 318 (across from the bank). Faculty members of Stony Brook will be present to advise students.

### Computer Science Courses

MSC-525-Sect.2-Operating Systems, Mon. 6-8:30 p.m. BNL

MSC-533/EMP-509 Management Information Systems, Wed. 6-8:30 p.m. Stony Brook

MSC-552 Microprocessors, Thurs. 6-8:30 p.m. Stony Brook

### Applied Mathematics Courses

MSA-536 Queuing Theory, Wed., 6-8:30 p.m. Stony Brook

MSA-540 Modelling Laboratory, Mon. & Wed., 4:25-5:40 Stony Brook

MSA-569 Introduction to Applied Probability, Tues. & Thurs., 6:30-7:45 Stony Brook

EMP-503 Legal & Regulatory Aspects of Management, Tues. 6-8:30 p.m. Stony Brook

For further information call Esther Weitzman, Stony Brook at (516)-246-5967.

## Pagani (Cont'd)

ergy Systems for Sardinia and Italy do not predict the future. Instead, using computer models, he is able to construct different scenarios of what the future might be. He can thus evaluate the consequences of different energy policies.

Pagani has also been working under Salvador Bozzo, in Leonard Hamilton's Biomedical and Environmental Assessment Division in the National Center. Through them, he has gained research experience by studying complex relationships between environmental factors and socio-economic factors in determining mortality rates and population structures.

Pagani was originally invited to Brookhaven by Leonard Hamilton, on recommendation of Daniel Serwer, a former BNL employee who is now U.S. Scientific Attaché in Rome. In Italy, Pagani is an assistant professor at the Institute of Environmental Technology of the Polytechnic of Turin, where he teaches a course that covers a range of energy topics. With some of his colleagues from the Institute, he also does consulting work in solar architectural design and recently won a competition for a solar heated school, which will use 600 square meters of collectors.

He is eager to return to Italy to follow construction of the school. But more than that, he wants to share his research experience at BNL with his students and colleagues. He hopes to visit BNL again to continue his research in energy and environmental analysis.

## Selected Reading

Nature 281, October 18, 1979

Holland's science shops for "made-to-measure" research. T. Ades. 519-20

New Sci. 84, October 25, 1979

Interview with Dr. Harold Edgerton, inventor of the stroboscope. L. Torrey. 264-7

Why clinical research is failing. S. Shuster. 268-70  
Engineers face a tougher future. J. Stansell. 283-5

## Arrivals & Departures

### Arrivals

Rabelan S. Baloyi.....Safety & Env. Prot.  
Marian R. Canu.....Safety & Env. Prot.  
Roger W. Davis.....Accelerator  
Richard G. Eggert.....A.U.I.  
Robert G. Geib.....Central Shops  
Marie A. Heseckiel.....Medical  
Peter T. Murphy.....Plant Engrg.  
Lavina A. Noack.....Energy & Env.  
Rolf E. Olsen.....Accelerator  
Peter J. Schirmer.....Ph. & Gr. Arts  
Arlene F. Waltz.....Dir. Ofc. (DOE)  
David S. Warburton.....Accelerator  
Craig L. Woody.....Physics  
Florence T. Cua.....Safety & Env. Prot.  
Leonard S. Baker.....Accelerator  
Dennis P. Weygand.....Physics

### Departures

Thomas W. Allen.....Accelerator  
Donna J. Falkowski.....Energy & Env.

## Cooking Exchange

Come watch us "cook our goose" at the Cooking Exchange meeting on Wednesday, November 14. We'll also be cooking soup in a pumpkin shell and demonstrating some other traditional and non-traditional Thanksgiving foods. Gather together to share our Thanksgiving feast.

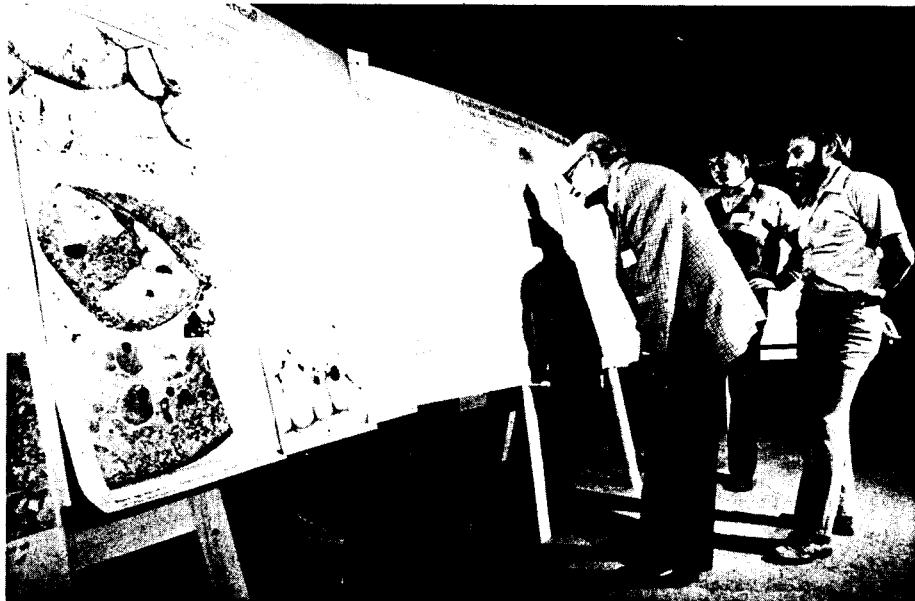
Cooking Exchange meetings are held at the Recreation Building from 12:30 to 2:30 p.m. Admission is \$1 and babysitting is 25¢ per child.

If you have any questions about the meeting call Ruth Fernow, 928-8465 or Wendy Green, 878-8952.

## Holiday Hams

Fully cooked and decorated hams are now available at the Cafeteria for the upcoming holiday season. They cost \$1.59 per pound and average 11 to 15 pounds. To place your order, call Ext. 3541.

## Biology Symposium



Biologists from all over the world gathered at Brookhaven this week for a symposium on genetic engineering of osmoregulation, a mechanism by which plants and animals maintain proper amounts of water in their cells. Recent evidence suggests that osmoregulatory mechanisms in bacteria and plants may be similar. If so, laboratory manipulation of those mechanisms in bacteria, using genetic engineering techniques, may shed light on the process of osmoregulation in higher plants. Such research might eventually help increase productivity of crops exposed to environmental stress. At the poster session, Siegfried Treichel (center), Institut für Botanik Fachbereich Biologie, Darmstadt, Germany, made a presentation on proline accumulation in halophytes. Two organizers of the symposium, Alexander Hollaender (left), AUI, and Ray Valentine, University of California at Davis, examine Treichel's poster.

—photo by Humphrey

## On The Aisle

"Otherwise (an adult comedy) Engaged" – such is the announcement of the title of the play on the cover of the program – the latest production of the BERA Theater Group again scheduled for Friday and Saturday evenings, November 9 and 10. It opened last weekend.

An adult comedy it is – witty and sharp – a comedy particularly well chosen for the sophisticated Brookhaven audience. It is the kind of play only an English playwright can compose. It's a difficult play for amateurs and is also pretty much a one-man show. Without a strong actor in the leading role, the play could be a disaster. The BERA production comes off splendidly largely because of a well selected cast and primarily because of the adept handling of the difficult role of Simon Hench by Tony Fainberg. It's a role not only suited to his talent but also the kind of part he enjoys playing. With this combination, Tony offers the audience one of his finest performances.

Although their stage time was limited, Bonnie Biittner and Carrol Lasker were particularly convincing in their roles. Bonnie's fine acting, undoubtedly the result of Roscoe Mark's direction, makes her the season's leading candidate for the rookie actress of the year award.

The supporting role cast was a good mix of the experienced Kurt Fuchel and the versatile Bill Love, combined with Josh Kopp and Dennis Weygand. Their varied roles were played with enough diversity and enthusiasm to provide the needed support to Tony Fainberg.

"Otherwise Engaged" is not a play for everyone. This kind of comedy must be to your liking and will be if you are an alert and a not afraid to think playgoer. A bit of advice – don't overindulge with cocktails or a heavy meal before attending the play. You must be alert to enjoy its quips, its nuances and its subtleties. If you are, you'll find "Otherwise Engaged" most engaging.

It's an 8 p.m. curtain at Berkner Hall. Admission: General \$3; senior citizens and students \$2.

—John Binnington

# BROOKHAVEN BULLETIN

Published weekly for the employees of  
BROOKHAVEN NATIONAL LABORATORY

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## Scotch Doubles

The Annual Scotch Doubles Bowling Tournament is set for Sunday, December 2, from 12:30 to 4:30 p.m. at the Port Jeff Bowl. Team entry fee of \$10 includes the cost of bowling. At least one member of each team must be a BNL employee. Entry forms and rules are available at the BERA Sales & Services Office in the Cafeteria. The deadline for applications will be 1:00 p.m. on Wednesday, November 21. For those who need a partner, call Matchmaker Service, Helen Keeley, Ext. 4719. For additional information call Betty Jellett, Tournament Chairperson, Ext. 3639, or Rich Larsen, Ext. 3464.

## Volleyball

**Open League** - Play will begin Wednesday, November 14. Because of insufficient interest in a second division, there will be only one. Tom Owens (Ext. 2963) is preparing schedules for distribution to team captains.

**Mixed League** - Due to the upcoming holiday, play will not begin until Monday, November 19. League play will be on Monday nights only. There has been one rule change: Female players may serve overhand. Ken Sutter (Ext. 4514) is preparing schedules for distribution to team captains. There is still room for one more team.

## November Bike Rides

The locations given are where the SBRA rides start.

Sat. 10th, 9 a.m. Carl Hart's Bicycle Shop, Middle Country Rd., Middle Island; 50 miles, intermediate.

Sun. 11th, 9:30 a.m. Syosset RR Station to Sagamore Hill. 30 moderate miles.

Sat. 17th, 10 a.m. Midway Diner, just south Exit 70 L.I.E.; 25 mile loop thru Manorville, Eastport. Intermediate.

Sun. 18th, 1 p.m. George's Bike Shop, Nesconset Hwy, Stony Brook. Slow family tour of Stony Brook and Setauket.

Thurs. 22nd, 7 a.m. Carl Hart's Bicycle Shop. Fast 28 mile loop thru Bellport and Patchogue.

Sat. 24th, 10 a.m. Smithtown Library. Intermediate tour of Smithtown.

Sun. 25th, noon. Cathedral Pines County Park, Middle Island - Yaphank Rd. Family picnic ride.

For additional info call Bob Monaghan, Ext. 4824/4688 or 744-5098.

## Stony Brook Events

**Concert:** Stanley Clarke, bass guitarist, Nov. 11, 9 p.m., Gym. Tickets are \$7.50 and \$5.50. Information: 246-7085.

**Concert:** Talking Heads, Nov. 15, 9 p.m., Gym. Reserved tickets, \$7.50; general admission, \$5.50. Information: 246-7085.

**Dance:** Alvin Ailey Repertory Ensemble, Nov. 18, 3 p.m., Main Auditorium, Fine Arts Center. Tickets are \$11, \$9, and \$7. Information: 246-5678.

## Soccer

The BNL indoor soccer league will start Friday, November 16. All those who are interested in participating should show up for some pick-up games Friday, November 9, at 5:00 p.m., or contact Ralph Fairchild, Ext. 3649, of their intent.

## Bowling News

### Green League

With the first position night over, the Blue Jays are in first place as they took 7 from the Trouble Shooters. For the losers S. Carrier had a 201. The Light Source took 6 from the Sparks and moved into second place. The Pinball Wizards battled the Phoubars for 8. T. Prach had a 214/583 scratch series. The Old Timers II took 4 from the Strangers. B. Galen had a 212.

### Gold League

Personnelities took 11 from Fission and moved into first place. Fifth games were bowled by Marie Susa 175, Marsha Kipperman 160/169, Kay Conkling 155/151/159, Fran Scesny 156, Dot Marelli 151.

### Blue & Gold League

Position night proved interesting with Walt Milian having a 514/616, Bud Pollock 504/642, Carl Jacobs 625 and Dick Adams 502 scratch. Dru Hanrahan had a 183/240 gross game 618 gross series. Other good games were bowled by Mary Scheidet 166, Sue Perri 155, Betty Roche 151, Ann Stonebridge and Dot Pollock shared a 145, Barbara Murgatroyd 146/608 series and Ruth Sheehan with a 605 gross series.

### Purple & White League

The Good Times are in first place by 4 points. Jim Griffin's 571 was high series for the men and Joyce Pinelli had a 510 for the ladies. The Drafts netted a 733 scratch 900 gross with Ed Sperry bowling a 220 and Joyce Pinelli 219. Other good games were Gail Schuman 212, Betty Jellett 195, Jeanne Penoyar 192, Lynn Boyd 189/184, Mary Grace Meier 188, Mary Austin 179, Sharon Smith 179, Ken Riker 212, Roy D'Alsace 199.

### Pink League

Helen Keeley had a 199/515 series for the night. Good games were bowled by Renie Rosati 180, Carol Beckner 180, Millie Connelly 171, Ellie Adams 168, Deb Johnson 167, Pat Jencius 165, Pat Lebitski 164, Marie Grahn 163 and Maria Apelskog who had a game 44 pins over average.

### Red League

The Sandbaggers won 8-3 over the Old Timers with 3052 wood. K. Riker had a 236/676 gross, R. Meier 233, A. Dick 631 gross, W. Reams 207/628 gross, J. Roesler 200 and C. Bohnenblusch 203. The Strangers took the Old Timers II 7-4. J. Walker grossed 603. The Freon Loaders took 8 in a match with Isa. V. Bilms had a 236/638 gross, R. Barberich 202, N. Greenlaw 604 gross. The 76'ers bowled unopposed with R. Larsen having a 224, J. Petro 632 gross.

## Carr Program Change

The program to be presented next Tuesday evening by cellist Colin Carr and pianist Jonathan Feldman has been changed to include Bach's Suite No. 4 in E flat for Unaccompanied Cello, the Sonata in A major, op. 69 by Beethoven, and the Sonata in A major of Cesar Franck. Mr. Carr whose American debut last winter drew rave reviews in the New York press is well known to European audiences through his appearances as soloist with such orchestras as the Amsterdam Concertgebouw, the Berlin Philharmonic and the English Chamber Orchestra.

Mr. Feldman has recently appeared as guest artist with the St. Louis Symphony and the Boston Pops, and has recorded for Columbia Masterworks and RCA Red Seal. Harold Schoenberg of The New York Times described his recent New York recital as "expressive, warm and lyrical" and went on to call him a "superb pianist, with complete mastery of the notes."

The performance, the second in this



season's BERA Concert Series, will begin at 8:30 p.m. on Tuesday, November 13 in Berkner Hall. Tickets are \$5 for general admission, \$3 for students and senior citizens and \$2 for those under 18.

## Rifle & Pistol Club

The following films will be shown after the business meetings held in the large conference room in Bldg. 490, Medical Dept.

- 11-14-79: "Call of the Claybird"
- 12-12-79: "Upland Gunner" and "Metallic Silhouette Shooting"
- 1-9-79: "Wild in the Sky" and "Tale of the Whitetail"
- 2-13-79: "High Country Mulies"
- 3-12-79: "Yukon Free and Wild"

## Cafeteria Menu

### Week Ending November 16, 1979

<b>Monday, November 12</b>	
(Snack bar service 9:00 a.m. to 2:00 p.m.)	
<b>Tuesday, November 13</b>	
Beef barley soup	(cup) .35
	(bowl) .45
Batter fried steak & 1 veg.	1.45
Franks & beans	1.15
Hot Deli - Pastrami	(on bread) 1.30
	(on roll) 1.40
<b>Wednesday, November 14</b>	
Thanksgiving Special	2.25 plus tax
Turkey noodle soup or apple cider	
Choice of:	
Roast turkey w/dressing, giblet gravy & cranberry sauce	
or:	
Baked sugar-cured ham w/raisin sauce	
Choice of:	
Candied sweet potatoes & mixed vegetables	
or:	
Whipped potatoes & mashed yellow turnips	
Apple, pumpkin or mince pie	
Coffee or tea	
<b>Thursday, November 15</b>	
Chicken rice soup	(cup) .35
	(bowl) .45
Chicken pattie parmigiana	1.45
Beef liver w/onions & 1 veg.	1.20
Hot Deli - Barbequed beef	(on bread) 1.30
	(on roll) 1.40
<b>Friday, November 16</b>	
Cream & celery soup	(cup) .45
	(bowl) .55
Pot roast & 1 veg.	1.45
Salmon cakes w/cream sauce & noodles	1.25
Hot Deli - Smoked tongue	(on bread) 1.30
	(on roll) 1.40

## Classified Advertisements

### Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants.

The determination of the best-qualified candidate for available positions will be based upon education, experience and other job-related criteria. Such factors will be evaluated and measured against the demonstrable requirements of the available vacancy, as well as the Laboratory's Affirmative Action objectives.

The Laboratory is committed to a policy of Equal Opportunity in its selection and placement of personnel. Its objective is equality of opportunity in employment, training, and promotion without regard to race, color, religion, national origin, sex, age or handicap.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all nonscientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment, as indicated below. Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Personnel Placement Supervisor, Ext. 2882.

**LABORATORY RECRUITMENT:** Opportunity for present Laboratory employees.

1148. LABORER (five positions) - Plant Engineering Division.

1149. LAMP CLEANER - Plant Engineering Division.

1150. DRIVER (four positions) - Plant Engineering Division.

1151. RIGGER'S ASSISTANT (four positions) - Plant Engineering Division.

1152. ADMINISTRATIVE STAFF POSITION - Requires a bachelor's degree or its equivalent and several years broad administrative experience. Must have excellent oral and written communication skills and have demonstrated skills as a self starter. Will function within a very diversified set of job responsibilities with changing priorities. Directors Office.

1153. FIREFIGHTER - Previous experience with fire-fighting and emergency medical technician training is highly desirable. Must be willing to work shifts at the completion of a 13 week training period. Safety and Environmental Protection Division.

