PRICE

sion and back fusion. This was obviously a source of concern to the JCAE members, many of whom have worked for years to get the fission program going. The point was repeatedly made by the scientists at the hearing that fusion could not be expected to replace fission at this point because CTR is not yet at a working stage.

There was, however, a feeling of optimism that was shared in varying degrees by almost all the physicists at the hearing and many of the subcommittee members. Many involved in the hearings thought that fusion should get money according to Gould's lower-limit guidelines. On the committee side, several obviously felt that funding for fusion should be increased. Senator Stuart Symington told us, "We should put more money into fast breeder reactors and fusion reactors because they, especially the latter could well decide the world's future." Others felt that, while fusion holds bright promise, the CTR program has to fit in along with a lot of other funding requests and will have to go step by step. Congressman Craig Hosmer told PHYSICS TODAY that he predicts about $35 million for the next fiscal year, and he said that CTR funding will have to be evaluated on a yearly basis. —SMH

Staff changes at NSF Physics Section

The new head of the Physics Section at NSF is Marcel Bardon, formerly program director for intermediate and high-energy physics. He replaces Paul F. Donovan, who is now director of the Division of Advanced Technology Applications in the RANN (Research Applied to National Needs) program.

J. Howard McMillen, formerly program director for elementary-particle physics, has retired from NSF. His replacement is Jonas Schultz, who is on leave from the University of California, Irvine.

Solid-state and low-temperature physics support (except for three small grants) has moved to the Division of Materials Research, where Howard Etzel is deputy director and Richard Silberglitt is assistant program director for solid state and low-temperature physics. Both men were formerly in the Physics Section.

Continuing in their former positions are William S. Rodney (nuclear physics), Rolf Sinclair (atomic, molecular and plasma physics) and Howard S. Zapolsky (theoretical physics).

Paul Craig, formerly staff associate in the Physics Section, is now a program manager in the Division of Advanced Technology Applications. —GBL

NSF recommendations for environmental science

Environmental Science—Challenge for the Seventies has been issued by the National Science Foundation. This is the third annual report of the National Science Board, the 25-member policy-making body of the NSF.

In the report, environmental science is defined as "the study of natural processes, their interactions with each other and with man, and which together form the earth systems of air, water, energy and life."

Colleges and universities should provide new curricula for the training of environmental science specialists and the retraining of persons originally educated in other fields, the report recommends.

The report says that future environmental efforts will necessarily follow three directions: the attempted solution of global problems, attempts to solve regional or local problems and basic scientific investigation of environmental phenomena. According to the report, the Federal Government should determine priorities and feasible time-scales for national environmental programs, provide for coordination of the efforts of all Federal agencies engaged in support of performance of research in environmental science, establish organizational and employment incentives for environmental science projects through the support of national centers and specialized institutes and encourage state and local governments and private supporting organizations to participate in the national program.

The report, which was prepared under the direction of H. E. Carter, the chairman of the National Science Board, is available from the Superintendent of Documents, Washington, D. C. for $0.40 per copy.

NSF, NRC and AIP report on job problems

Physicists with PhD degrees are having fewer employment problems than chemists and engineers, although new PhD physicists are having more difficulty than other new PhD scientists and engineers. The current rate of unemployment for all PhD physicists is only 1.8%, but the combined rate of unemployment and underemployment for new PhD physicists is 5.0%. These are some of the findings of an employment survey by the National Science Foundation for all scientists and another by the National Research Council for scientists who received their PhD degrees in 1970. A survey conducted by the American Institute of Physics, of physicists who reported having difficulty finding employment, indicated that after six months of seeking a job, 7.0% of these PhD physicists were still unemployed.

When the NSF survey, which was issued earlier this year (see PHYSICS TODAY, September, page 63), was studied with regard to age and degree, it showed that employment seems to be especially difficult for young physicists. The unemployment rate for those physicists in the 24-and-under and the 25–29 age groups is almost twice the rate of physicists in other age groups (see Table 1). Young chemists and young engineers do not appear to be having as tough a time as do young physicists. For while the overall unemployment rate for chemists is 3.0%, the unemployment rate for those chemists in the 24-and-under age group is 4.6% and for those chemists in the 25–29 age group, 5.5%. Similarly the overall unemployment rate for engineers is also 3.0%, while for those in the 24-and-under age group it is 5.5% and for those in the 25–29 age group, 3.3%. However, young PhD physicists

Table 1. Unemployed physicists

Age	Unemployed	Labor force	Rate (per cent)
24 and under	9	149	6.0
25–29	346	4878	7.1
30–34	297	7534	3.9
35–39	149	5114	2.9
40–44	109	3931	2.8
45–49	92	3323	2.8
50–54	65	1902	3.4
55–59	28	1170	2.4
60–64	19	698	2.7
65–69	4	317	1.3
70 and over	4	77	5.2
No report	4	38	10.5
Total	1126	29131	Avg. 3.9

Table 2. Breakdown of unemployed by degree

Age	BS/BA	Rate (per cent)	MS	Rate (per cent)	PhD	Rate (per cent)	Less than BS or no report
24 and under	6	7.0	3	4.8			
25–29	134	7.6	195	8.7	14	1.6	3
30–34	71	5.7	161	6.5	64	1.7	1
35–39	36	4.9	60	4.1	53	1.8	
40–44	23	4.2	47	4.6	38	1.6	1
45–49	30	6.0	30	3.3	32	1.7	
50–54	20	5.7	19	3.5	26	2.6	
55–59	6	3.7	8	2.2	13	2.0	1
60–64	3	3.7	5	2.1	11	2.9	
65–69	1	4.2	1	1.1	2	1.0	
70 and over					4	7.3	
No report	2	12.5	1	14.3	1	6.7	
Average		6.0		5.6		1.8	
Total	332		530		258		6

seem to have less of a problem than young PhD chemists, for 3.8% of the PhD chemists in the 25–29 age group are unemployed as compared with 1.6% of this age group for PhD physicists.

Although the rate of unemployment is generally higher for scientists with lower degrees, this trend is especially pronounced for physicists. For while the unemployment rate for BS or BA-degree physicists (6.0%) and for MS-degree physicists (5.6%) is more than three times the rate of unemployment for PhD physicists (see Table 2), the unemployment rate for BS or BA chemists is 3.5%, for MS chemists, 3.5% and for PhD chemists, 2.1%; the unemployment rate for BS or BA engineers is 2.8%, for MS engineers, 3.2% and for PhD engineers, 1.9%.

Despite the low rate of unemployment for PhD physicists as compared to other scientists (as shown by the NSF results), the NRC survey indicates that the percentages of unemployed and underemployed among the 1970 physics graduates were both almost twice those percentages for all sciences. The NRC survey, conducted in the winter of 1970–71, also surveyed 1969 graduates and found a sharp increase in the rate of unemployment and underemployment of the 1970 graduates over the 1969 graduates at that time. Of the 1287 PhD physics graduates in 1970, 2.1% were employed in positions where their skills were not being utilized, 2.3% were still seeking employment and 0.6% were no longer seeking employment. Of the 1104 graduates in 1969, only 1.1% were underemployed, 1.2% were seeking employment and 0.3% were no longer seeking employment. The larger rate of unemployment for 1970 graduates may indicate a tighter job market, but it is also an indication of the importance of an extra year in obtaining employment.

The AIP survey, conducted in November 1970, concurs with the NSF survey's findings that PhD physicists have less difficulty finding jobs than do physicists with lower degrees; for of the 2700 physicists having job difficulty that were surveyed, 15% of those with MA degrees and 23% of those with BS degrees were still unemployed after six months of job hunting.

The survey, which focused on 1970 graduates, indicated that a large number of the employed PhD physicists only held temporary postdoctoral positions. However, the majority (214) of the 321 permanently employed PhD physicists who received their degrees in 1970 (and were having job difficulties), were employed in positions that require an extensive use of physics and only 14 did not use their knowledge of physics at all. This distribution was less true for MA physicists, where only 7 of the 44 employed physicists extensively used their knowledge of physics and an equal number did not use physics at all; for BA degree physicists, 18 of the 128 employed physicists extensively used physics and 49 did not use physics at all.

AIP is planning another employment survey to follow up these 1970 graduates and to examine unemployment among the 1971 graduates. —MW

U of Washington to study science-society links

"Social Management of Technology," a research program at the University of Washington, has been initiated under an initial grant of $158 000 from the National Science Foundation. The purpose of the program is to develop a model for the interaction of science and society and evaluate how scientific and engineering developments can be steered to meet the social and economic needs of the future. The principal investigator is Edward Wenk Jr, a professor of engineering and public affairs. Ronald Geballe, chairman of the physics department, is one of the co-investigators.

the physics community

Physics teachers find Keller-plan courses work

A recent conference at MIT's Education Research Center on the Keller plan attracted about 350 natural and social science teachers, including 75 physicists. The Keller Plan, a method of self-paced, mastery-oriented instruction has been gaining in popularity among physics teachers, ever since its popularization by Fred Keller, formerly head of the Columbia University department of psychology.

According to Ben Green Jr, staff physicist at ERC who organized the conference, several freshman courses in physics with large enrollments are using the Keller Plan and a greater number of smaller courses are trying it out.

Under the plan, the coursework for a semester is divided into a number of units, typically 15 to 20, with a study guide for each one. The guide tells what the student is expected to learn in the unit and then suggests ways that he might go about it. Each student proceeds with his work at his own pace, but he is allowed to advance to a succeeding unit only after having passed a brief quiz on the material. Several tests are provided with each unit, and failure on a test is not counted "against" the student; he simply has to study until he masters the material.

At MIT there are Keller Plan sections in six courses. The first semester of a five-semester introductory sequence was taught in the Keller style. Robert Hulsizer coordinated the course for 500 MIT freshmen.

Hulsizer's course involved 14 faculty members, 7 graduate students and 32 undergraduate tutors, who worked for academic credit. The course work was divided into 17 units and students were required to pass tests on each one to get a passing grade in the course.

How did it go? "I'm completely sold on it," Hulsizer told us, "I think it's far more successful than a recitation section