

Indeed, much of the success or failure of the program will depend on just how much managerial command NSF is able to exert. And for an agency whose grants have in the past been famous for the lack of strings attached to them, this is quite a challenge.

As for the tensions that might be

created in university science departments by NSF's managerial intervention and insistence on team efforts, Eggers said, "It is understandable that universities have been a traditional place where people gather to work independently. At the same time," he said, "university people are as aware as anyone else of the domestic prob-

lems facing us, and, as they come to grips with these problems, they see that they have to become part of a team."

Then, perhaps reflecting on the duties of an NSF administrator, Eggers added, "a lot of us are involved in things today that are not our first choice in life."—ROBERT J. BAZELL

## Peace Corps and Smithsonian: Deploying Environmental Experts

Before the end of 1971, the Peace Corps expects to have 100 specialists working overseas in a new environmental program launched in cooperation with the Smithsonian Institution. Although recruiting for this program did not reach a significant level until February, about 120 candidates have already applied to the Smithsonian, which handles most applications from environmental specialists who hold, or are currently pursuing, advanced degrees. During the next 3 years, Robert K. Poole, Peace Corps director of the environmental program, expects to place about 500 advanced-degree volunteers in natural resources and environmental projects.

A less specialized program for volunteers with bachelor's degrees is operated directly by the Peace Corps, which has long been engaged in natural resource projects at less sophisticated levels. At present, about 300 volunteers work in such programs. The new environmental operation now getting under way is perhaps the most ambitious effort in the Peace Corps's search for specialized skills, a search intensified since Joseph H. Blatchford was named director in 1969.

### Academic Credit

Recruiting for specialists has been directed primarily at students and faculty in universities. Candidates for master's and doctoral degrees are encouraged to work out arrangements with their institutions to receive academic credit for research and experience overseas. The character of the research and other responsibilities performed by the volunteer, however, is

determined by the host country requesting his service. Experienced senior specialists, as well as young degree candidates, are being recruited for the program. The shrinking of research funds, Poole observed, makes the opportunities in the new program especially attractive at this time.

Regardless of their level of expertise, all volunteers receive the same compensation. Subsistence allowances vary from one country to another, but provide a standard of living roughly equivalent to that of colleagues in the host country. In addition, each volunteer accrues \$75 readjustment allowance per month of service. Married couples, thus, accrue \$150 per month; this figure is increased to \$200 if they have children. Educational as well as subsistence allowances are provided for children overseas. In some areas, however, local conditions make it impossible to assign volunteers with children.

The Peace Corps makes available to host governments lists indicating the qualifications of applicants, while lists of personnel requested from overseas are distributed to universities in this country. The Smithsonian and the Peace Corps, then, try to fit together the man and the job. Sometimes the applicants and the jobs seem made for each other. James Joy wrote his Ph.D. thesis on the bilharzia snail, which Ghana hopes to control through the dispersion and population development of a parasitic insect. His wife Susan has a master's degree in entomology, with specialization in parasites. In response to a request from Colombia for a volunteer experienced in wildlife manage-

ment and park administration to assist the director of its North Coast National Parks, the Peace Corps has found Richard W. Klukas, who has had 5 years of such experience in Everglades National Park.

The Peace Corps is now establishing a special program with the National Park Service. Employees entering the service can spend 1 year in the United States gaining the experience and training appropriate for a specific assignment overseas. After 2 years in their Peace Corps posts, they will return to the Park Service with full credit toward promotions and retirement for their work as volunteers.

A number of international agencies have also been approached to serve as channels through which host country requests might be directed. International agencies can provide a vehicle for environmentalists to work in countries that do not have Peace Corps programs. For example, Madagascar has requested that a volunteer be assigned to the Food and Agriculture Organization of the United Nations for the purpose of surveying the ecosystems of existing and potential national parks.

### Preindustrial Ecological Troubles

The Smithsonian was asked to assist the Peace Corps because of its experience and prestige in international research. At present, the focus of recruitment is on the life sciences, but areas of demand for highly qualified specialists such as geophysicists or even archeologists may develop in the future. Richard L. Jachowski, who directs the Smithsonian's efforts, says there is "no boundary on paper" that might prevent him from recruiting in new fields of specialization.

The need for environmental programs in developing countries is often underestimated, Poole told *Science*. A former Peace Corps director in Malawi and Kenya, Poole attributes this mistake to the popular identification of

ecological problems with industrialization. But disturbing forces such as overgrazing, deforestation, and population growth can have devastating consequences in preindustrial regions. Moreover, Poole stressed, countries beginning industrialization might, through enlightened policies at this time, avoid some of the difficulties with which advanced countries are now struggling.

Poole believes that developing countries are genuinely interested in environmental programs, despite the risk that powerful demands for industrialization may reduce their priority. He criticizes Western experts who wonder "how we can delude the developing countries into concern with ecology," and blames this patronizing approach

on failure to recognize the economic benefits of ecological reforms in agriculture and resource management, as well as the costs of antipollution efforts in industrialization.

Kenya offers a good illustration of the variety of requests for volunteers with advanced degrees. The government has asked for an environmental specialist to study several types of pollution, a marine biologist to establish a marine department at the National Museum, three conservation educators, and a team of four to work at the University of East Africa on the reproductive endocrinology of *Tilapia*, a food fish. This team would include, if the specialists can be found, a steroid biochemist, a protein biochemist, a

radioimmunologist, and an electron microscopist.

The scientist might also be sent to the rescue of the monkey-eating eagle of the Philippines or a dwindling species of condor in Colombia. He might not have the chance now, however, to enjoy skin diving in the Kingdom of Tonga, because a young couple has already been recruited for the assignment in that South Pacific island. They will work on their master's degrees by studying spiny lobsters, freshwater shrimp, baitfish for a potential tuna industry, and the "crown of thorns" starfish. Enchanted, perhaps, by their prospects, the couple's professor has sent in his own application to the Peace Corps.—D. PARK TETER

## Radioactive Cargoes: Record Good but the Problems Will Multiply

At 9:35 p.m. on 31 March 1971, one of the trainmasters for the Burlington Northern Railroad in Missoula, Montana smelled smoke while making a routine check of a mile-long freight-train from Hanford, Washington, which had pulled into the station 5 minutes before. The odor, he found, came from a single, smoking boxcar labeled with a diamond-shaped seal: "DANGEROUS: RADIOACTIVE MATERIAL."

In the next 5 hours, the Missoula Fire and Police departments with AEC radio guidance coped with their first experience with radioactive materials. They moved the smoking boxcar to a rail siding several miles from the station; after finding that the radioactivity readings were low, firemen opened the car door, entered, and aimed their conventional water spray at the strange blue flames they found at one end of the car. But, as a result of the heat, a gaseous reaction occurred, causing loud popping and sputtering noises. The firemen—then standing atop the boxcar's layer of 74 crates of crude uranium scrap and ingots—were alarmed and, in the words of one, "we beat it out of there." By radio AEC advised them that there was no hazard and told them to go back and cover the fire with sand and water. Presently, although the blue

flames continued to creep through the sand, after 10,000 gallons of water had been dumped in the car, the fire went out. The AEC's men arrived at that time, having left from nearby Idaho and Washington facilities when the fire was first reported. They then ascertained that radiation was in fact at normal background levels.

The incident caused a small flare-up in the Missoula press; but when neither firemen, their clothing, nor the boxcar were found contaminated in the following weeks, news of the matter blew over. Nonetheless, Missoula fire marshall Meredith Fite recalls the whole incident as having been "pretty spooky."

The Missoula boxcar fire was one of a type of harmless but "spooky" shipping incidents that occur with relative frequency on the AEC's remarkably safe shipping records. But it points up a problem—the hazards of shipping radioactive materials—which will grow larger as the nuclear industry proliferates and when the numbers of shipments of spent reactor fuel grow to a predicted 70,000 percent between now and the year 2020.

Thus, the problem of safe transportation of radioactive materials should be added to the problems already being posed by what the AEC terms "our

nuclear future": environmental preservation, public health and safety, and the chance of a black market in nuclear materials (see *Science* 9 April 1971).

Ninety-five percent of the radioactive cargoes in transit are small industrial and medical items—isotopes, watch dials, x-ray materials, etc. The other 5 percent is more spectacular: large shipments, sometimes in huge steel or lead casks, principally of uranium. In the future, these will be mostly shipments of very hot plutonium. This portion includes the fuel and fuel elements traveling to and from nuclear reactors, processing and reprocessing plants, gaseous diffusion plants, and waste-disposal sites.

Since World War II, there has never been a recorded major accident that has killed, injured, or overexposed people as a result of the radioactive contents of a shipment. But those in and out of the AEC who are concerned with shipping admit that someday a serious accident could happen. And, although such an event would most likely not be a bomblike explosion, it could result in radiation damage to hundreds of people and in phenomenally expensive and numerous claims.

D. E. Patterson, in a 1967 study of shipping risks which is still current, stated for the AEC, "it is virtually impossible to design a package to survive any possible accident."\* And Alfred W. Grella, who oversees radioactive shipments for the Department of Transportation's Office of Hazardous Materials, says, "it is likely that someday

\* D. E. Patterson "The Accident Experience of The USAEC In The Shipment of Radioactive Material" 1968.