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GEOLOGY

REPORT OF THE FIRST NATIONAL CONFERENCE  
ON MINORITY PARTICIPATION IN EARTH SCIENCE  
AND MINERAL ENGINEERING

Sponsored by the Department of the Interior  
and  
the Colorado School of Mines

June 7 to 9, 1972

Cecil H. and Ida Green Graduate and Professional Center  
Golden, Colorado

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CONFERENCE ON MINORITY PARTICIPATION  
IN EARTH SCIENCE AND MINERAL ENGINEERING

We are pleased to join in sponsoring the Conference on Minority Participation in Earth Science and Mineral Engineering to be held on June 7 to 9, 1972 in Golden, Colorado. The sessions will be held in the new Cecil H. and Ida Green Graduate and Professional Center of the Colorado School of Mines. The immediate goal is to launch a program for increasing the participation of minorities in the earth sciences and mineral engineering. The long-range goal of greater minority participation in all fields of science and engineering is important, of course, but we believe it wise to concentrate on a clearly defined area as a first step.

In the last decade many barriers have fallen which impeded participation by minorities in professional careers but, despite this general progress, there are few minority members in earth science and mineral engineering. The Nation needs trained manpower in these fields and minority youth needs career opportunities. The objective of the Conference is to devise ways whereby young people in minority groups may become aware of career potentialities and obtain the training necessary to qualify for positions in earth science and mineral engineering.

For this new departure we need help from leaders in the communities concerned; from the industrial, academic and governmental employers whose needs we are also trying to serve; and from the professional organizations which will carry out much of the program and strongly influence the training and recruitment processes.

We regard the conference on minority participation as an immensely important venture and we expect this conference, and the program to follow from it, to have national impact in opening up careers in earth science and mineral engineering to all citizens. It is our earnest hope that these efforts will lead to increasing participation by minorities in all scholarly and professional fields.

  
President  
Colorado School of Mines

  
Secretary of the Interior

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U. S. Department of the Interior

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## FOREWORD

On June 7 to 9, 1972, about 300 representatives of more than 100 national and local professional societies, civil rights and community organizations, educational institutions, governmental agencies, and industrial organizations met in the Cecil H. and Ida Green Graduate and Professional Center of the Colorado School of Mines, Golden, Colorado, in the National Conference on Minority Participation in Earth Science and Mineral Engineering. The Conference, the first of its kind, was sponsored by the Colorado School of Mines and the United States Department of the Interior. The proceedings of the Conference are contained in the following pages.

We in Interior regard the Conference as an important step in our commitment to provide increased opportunity for members of minority groups and women to enter the ranks of earth scientists and mineral engineers within the Department and in the professions at large. As a result of the Conference, we have established a Committee on Minority Participation in Earth Science and Mineral Engineering within the Department of the Interior. The Committee, headed by Dr. Randolph W. Bromery, Chancellor of the University of Massachusetts at Amherst, is already functioning in its role of advising the Department on how best to achieve the goals of the Conference.

In addition, the Conference Planning Committee has been reconstituted as an Interagency Staff Group to prepare recommendations for the Committee on Minority Participation and the bureaus of the Department. The report of the Staff Group was completed in March 1973 and is now being reviewed by the Committee and the Department.

Efforts of the Department of the Interior to increase minority participation in earth science and mineral engineering have been intensified since the Conference, and we expect these efforts to begin to show concrete results in the near future. It is noteworthy that the American Geological Institute and several of its member societies have recently established an Office of Minority Participation in the Geological Sciences to work with minority groups, educational institutions, and employers of earth scientists to expand opportunities for members of minority groups to pursue careers in geology, geophysics, and other earth sciences. We have also learned that many educational institutions and industrial organizations have intensified their efforts to increase minority participation in earth science and mineral engineering through establishment of scholarship funds, vigorous recruitment of minorities, upward mobility programs, and related activities.

I am confident that these actions will lead to significant progress toward the Conference goals by the end of this decade and complete elimination of discrimination against members of minority groups in the earth-science and mineral-engineering professions by the end of this century. The Department of the Interior wholeheartedly applauds and supports these important efforts.

A handwritten signature in cursive script, appearing to read "Edward J. Steu", with a long horizontal flourish extending to the right.

Director, Office for Equal Opportunity

Plenary Session

Wednesday Evening, June 7

Guy T. McBride, Jr.

President, the Colorado School of Mines

When we begin an enterprise of this kind, it is extraordinarily difficult to know where the thoughts will come from and in what direction they will lead. Do not be diffident about saying what you think. We are sailing on uncharted waters, so each of you is entitled to "look for the birds from the west" in this situation.

I am speaking to you as something of an oiler and wiper for a manufacturing process that is intended to convert uncertain, and sometimes refractory, raw, teenage material into earth scientists and mineral engineers. On the average, this manufacturing process takes a little over four years, a length of time which makes precise market predictions extremely difficult. Happily, however, it is possible to say that the demand for mineral scientists and engineers--perhaps in contrast to other areas of science and engineering--will be there in four years, in six years, or even eight years or more in the future.

We are quite sure of this for reasons outlined recently by Secretary of the Interior Rogers C. B. Morton in his agency's "First Annual Report of the Secretary of the Interior," as required by the Mining and Minerals Policy Act of 1970.

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Dr. McBride's introduction was preceded by welcoming remarks from David Crawford, the Mayor of Golden, Colorado, and Thomas W. Ten Eyck, the Executive Director of the Colorado Department of Natural Resources.--Ed.

This report, dated March 30, 1972, states in part that: "The United States' primary demand for minerals in the year 2000...is projected to rise to \$117 billion measured in 1970 dollars." That is the demand, and I would point out that the year 2000 is the time when the careers of students now enrolled in colleges and universities will reach their peak of productivity.

At the same time as the demand for minerals continues to rise, as it has for the past 20 years, the U. S. production of primary minerals in the year 2000 will reach \$53 billion--leaving a deficit of real, useable, consumable minerals of \$64 billion. The Interior Department report continues:

"It is mandatory therefore, as a matter of urgency, that policies be established and programs formulated and undertaken to create the social and economic environment necessary to further optimum development of mineral resources, and within prudent environmental constraints, to meet projected future minerals and energy requirements."

The report goes on to say that these objectives can be met by "improving the technology of minerals production and usage," but that this will require "increased attention by skilled scientists and engineers, supported by technical personnel. Regrettably, fundamental research and education in most fields of mineral science and technology are not only lagging behind the need, but the gap is widening. Federal and state governments and industry must cooperate with educational institutions and scientific research centers to reverse these trends."

Thus, Secretary Morton indicates that the promise of career opportunities in mineral science and engineering is made certain by converging, mutually reinforcing demands for more minerals and better technology at acceptable environmental costs.

Recognizing the need to recruit young people into the fields of mineral science and mineral engineering, one of our major mining companies, in cooperation with the Colorado School of Mines, has prepared a recruiting film entitled "The Earth People." The film is to be converted into a color filmstrip, with accompanying sound, for use by high schools. We would like to present it now for your comment. As you watch it, please remember that it is a recruiting film, and that it has not been prettied up for the benefit of this conference. We could have put in more members of minority groups than the film shows, and perhaps it will be your judgment that as a recruiting device it might well need that kind of alteration. Since it is our hope to distribute this film across the country, by the thousands of copies if they can be intelligently used, I urge you to review it and discuss it later during the conference.

Randolph W. Bromery

Chancellor, the University of Massachusetts at Amherst

To start this conference, we must first focus on what we are going to do here. If, after three days, we leave without at least the beginnings of some commitments and the beginnings of some programs to accelerate the entry of minority groups into the earth sciences and mineral engineering, then this conference will have gone the way of many other conferences that I have attended in the past 25 years.

It is difficult to know what to say as a beginning, but I would like to try a couple of things. First, to be very practical, I want to try to describe the dimensions of the problems of minority participation in the earth sciences. Second, I believe it is necessary at this point to set a philosophical tone. I am hoping that, as we move through these next couple of days, if we lose sight of the magnitude of the problems we face we at least will have the lifeline of a philosophy.

First, we must recognize that establishing scholarships and other types of programs to interest minority youths in entering the earth-sciences profession will be quite a job in itself. Relevancy is a problem. Simply going into the inner city and talking to young people, trying to tell them about geophysics, is going to be difficult. They are concerned about the relevance of what they do in life, and we are going to have to explore all

of our responsibilities in this respect. Moreover, we are talking about going into minority communities and searching out talent. And if we're not careful, we run the risk of draining off talent that is so sorely needed in other capacities in these minority communities. At the same time we must take care that in appealing to these young people the economic rewards we can offer them are honestly described and do not mislead them. In short, what I am saying is that in searching for talent we must not only develop programs in which to utilize it, but we must also assist minority communities in searching out still more talent. There is a tremendous amount of human potential in our minority communities, but it has yet to be tapped. It is our responsibility to begin.

There are other problems we face. Perhaps a couple of personal experiences and a few bits of irony will illustrate them.

One that I recall vividly occurred as recently as a couple of years ago, in connection with a federal project in Alaska. We had a Convair aircraft equipped for low-level magnetic surveys, and we were supposed to fly some survey lines from Fairbanks across the Yukon flats, the Brooks Range, the Arctic slope to the Arctic Ocean. In order for the U. S. Geological Survey to carry out this project, I was to request logistical support for our aircraft from the U. S. Air Force Pentagon Headquarters in Washington. It was at this point that I began to confront once again some of the difficult situations that minority youths will also encounter when we bring them into the alien and sometimes hostile environments of geology and geophysics.

Normally when you walk into a Pentagon office and try to get someone to pay attention to you, and you're a black civilian, you're in trouble. I spent a lot of time there trying to convince people that I was a project geophysicist and a professional representative of the Federal Government. In the end, I wised up. I learned that one of the first things one has to do is adjust to the situation. The answer was by way of a series of introductory letters that finally opened some doors. Rather than going into an office in the Pentagon unannounced, I learned to write a letter first, sign it "Geophysicist, U. S. Geological Survey," and then have a secretary call for an appointment. It's a lot like making hotel reservations in this country when you're black.

Having gone through all this, we flew to Anchorage, Alaska, where we received the VIP treatment from the Air Force. Then we flew to an Air Force Base near Fairbanks. While landing we could see a line of cars accompanied by a group of military brass waiting on the parking apron. As we landed and talked on the radio with the ground controllers, we were told to pull up in front of the line of waiting dignitaries.

"We want Dr. Bromery to get off first," ground control informed us. I had to look like a typical scientist, so I quickly took off my fatigues, put on the only suit I had brought with me, and grabbed a big briefcase full of aeronautical navigation charts. I stepped to the door as the plane rolled to a stop in front of the waiting cars and brass. The door was opened, and I started down the set

of stairs. I was about three steps down when a sargeant suddenly rushes up to me on the stairs and says "No, no, no, get back up. Dr. Bromery is supposed to come out first."

So you see that we're not only going to have to find minority people for the earth sciences, but we're going to have to change the environment they'll be working in as well--so that not everyone has to be a pioneer.

Let me now talk briefly about statistics. How many earth scientists are there, and how many, to the best of our knowledge, are minorities? By this I mean black, Spanish-surnamed, and American Indians. According to current records, there are at least 30,000 earth scientists in the United States. If we were to say that minority peoples should at least be represented in proportion to their distribution in the general population, then there should be some 5,000 earth scientists from minority groups, since we comprise between 17 and 18 percent of the nation's population.

In our recent efforts to find out how many blacks, Spanish-surnamed, and American Indians are professional earth scientists, we ran into some trouble. Heretofore, it was not only fashionable to identify minority employees by race, it was required by law. Of course, that was for a different reason. Today no one is supposed to admit that they even recognize someone as a minority, although I am sure that master sargeant did when he ran up the steps.

If I were to estimate how many black earth scientists I have known in the past 25 years, I would have to say four or five, including myself. In the earth sciences today there is a tremendous pressure to have a graduate degree, preferably a doctorate. And yet I have searched through the black population to the best of my ability and I have found only four with Ph.D.'s in the earth sciences; we have three-fourths of them right here in this room.

The Geological Society of America recently made a survey of the colleges and universities with earth-science departments to determine how many black Americans, Spanish-surnamed, and American Indians are currently enrolled. We think we obtained a fairly accurate number. We were able to identify about 120 black undergraduates and graduates majoring in geology. In graduate schools we found that there are nine master's degree students and five candidates for the Ph.D. Of the Spanish-surnamed, we found a total of 150 students, five of whom were working on a master's degree, and one was a doctoral candidate. By these figures, if population equity is our goal, we're running about 4,750 short.

To change this, of course, we will have to start with the grade-school level, and in the secondary schools. I should note that even at the University of Massachusetts, where our clientele is middle-class, suburban, and white, we get very few students

who want to major in geology--and yet we sell geology at the University of Massachusetts with all the zeal of a political campaign. Thus, while I think we need a campaign to interest young people in the minority communities, we can't expect it to happen at the high school-university interface. By then it's too late.

In sum, we have three practical lessons to keep in mind. We are going to have to go back to the elementary schools to interest minority youths in the earth sciences; we have a responsibility not to drain off talent needed by minority communities; and we have the job, especially those of us in government and industry, to try to change the hostile working environment. As for myself, if I had it to do over again--I'm not sure what I'd do. I am reminded of a former student of mine, he is black and his name is Vince, whom I sent out to a small town in the far northwest U. S. to conduct a geological mapping program for his thesis not long ago. Some of the people in this town harrassed Vince--he was the only black in town--and they terrified his wife. They literally ran Vince out of town, and convinced me that we have an overwhelmingly high mountain ahead of us in changing the environment out in the working world.

#### A Philosophical Context

This conference represents only a first step in a long and difficult journey. As we begin, I want to focus our collective attention on our neglected, deprived, oppressed people in our respective minority communities--because that is precisely what they are. They are also my brothers.

All of these young people undergo a special intensity of passion in growing up in the minority communities, although life to them at a very young age, still appears as it does to all other young people in this country--simple and not very momentous. But in the minority communities the complexities of life, its problems and contradiction, its special ambiguities and dangers, have a way of intruding upon this youthful innocence and nostalgic reverie, crowding them out of mind and out of memory.

For a minority person in a white world, this confrontation with reality and the loss of innocence comes very early, and not without pain and bewilderment. Often it produces a deep sense of personal isolation, a feeling of alienation so pervasive that it can lead to a denial of one's own self. I'm certain you will understand when I say to you that I know something about this kind of isolation.

Now, I am prefacing the philosophical part of my talk with this rather solemn note because the themes of alienation and isolation, though not new to us, are, I believe, at once symptomatic of, and contributory to, the deeper crises that afflict us. Frantz Fanon, the author of "Black Skin, White Masks," has remarked that intellectual alienation is the creation of middle-class society (although I would say it was the product). What did he mean by a middle-class society? He meant simply any society that solidifies itself in predetermined forms that forbid all evolution, all gain, all progress

and discovery. What we are trying to do here today runs across the grain of that rigid structure. We are trying to make progress and discover talent and we are confronted, in Fanon's phrase, with a "closed society in which life has no taste, in which the air is tainted, and in which the ideals and men are corrupt."

How does one maintain a faith in the efficacy of reason when one comes to understand that appeals to reason, or to respect for human dignity, have done little to alter the terrifying realities of racial and national hatreds and of a grinding poverty that afflicts so many in this most affluent of all nations? In our quest here, at this conference, for answers to such questions, it is critically important for us to remember that we speak from the vantage point of the relatively comfortable. Like it or not, in relation to the suffering and disenfranchised people of this country, we are a privileged community. And I mean more than simply material privilege; I mean the more important privilege of choice.

The lessons of the minority struggle for survival and liberation in this country have been, and continue to be, a revealing and shattering experience for many of the "privileged" who have begun to feel and understand it. With this growing awareness has come the frightening realization that not all men and women in America are really free; that human bondage is as much a state of mind as a condition of the body. With this knowledge we can

understand why it is that with every material, legal, and moral victory grasped by this country's minority peoples, their insistence for equality grows even more truculent and urgent. It is not simply equality of opportunity or of possession that is demanded, but it is also a hunger for equal belonging, a claim for equal space which we collectively occupy for psychic as well as physical room in which to breathe and grow.

Peter Marin put it this way in a recent issue of Saturday Review:

"What matters after all, especially in times such as ours, is never how saved or whole one is, but the extent to which one restores to others, through presence and passion, a sense of possibility and independence."

That is what we seek. A sense of possibility and independence. We in the minority communities understand this need. The challenge to the earth-science professions is to help us in gaining it.

Discussion

George Brown

Colorado State Senator representing District 6 in Denver, and  
Executive Director of the Metro Urban Coalition in Denver

I want to start by commending the program planners for this conference. I think the time has long since come for persons in professional fields such as this to address themselves directly to minority participation in the earth sciences and mineral engineering. I suppose that one reason this has come about is that Lou Pakiser (Chairman of the conference organizing committee) is an alumni of Denver's Manual High School. For those of you who are not from Denver, this is the one high school that has been in the area where most of the black folks and the poor folks have lived from the time we first came into this city.

In holding this conference, I hope you're not too late. For millions of blacks, Chicanos, Indians, and Puerto Ricans, who, for all practical purposes, are already dead to opportunities for new careers, you are too late. These people have been killed in our educational system. They have been killed by not having opportunity-- just because of the color of their skin or the way they spell their last names.

Mr. Carpio (Professor of behavioral science at Metropolitan State College in Denver) and I have a dilemma today, in that we were asked to discuss with you Denver's inner city and its hopes, its problems, and its people. But the problems in my city are the

same as the problems in any city. All of the ingredients of oppression and poverty are here in this city. The only difference is that some cities have more and some have less. I don't think it serves any useful purpose for me or anyone else to keep trying to define the problems, to find new words that tell us all what we already know about this country.

I suppose our greatest hope is for change--progressive change. Though as we look for change I think we recognize with dread that the problems of 1972 will not be solved by 1975. We remember the optimism that swept the country during the 1960's. Remember 1968? That was the year that the Kerner Commission report (on the causes of civil disorders) came out. This report said that there were three basic causes of the problems in our cities. The first was racial discrimination in employment, education, and housing. The second cause was the migration of poor blacks and poor Chicanos to the inner-cities and the concurrent movement of the white middle class to the suburbs. The third cause was the segregation and the poverty of the urban ghettos or barrios, which served to destroy opportunity and hope, to reinforce failure, and to submerge us all in crime, narcotics addiction, permanent welfare status and--perhaps saddest of all--in bitterness and resentment against society in general and white society in particular.

The Kerner report said America consisted of two societies.

(I disagree. Obviously, there was a Chicano society in 1968, as well as Indian, Puerto Rican, black, and white societies.) It is now four years later. We must be able to point to some dramatic improvements for persons in the inner cities. And yet it doesn't take a great deal of intelligence to conclude that schools are more tedious and turbulent than ever before, that rates of crime and unemployment and disease and drug addiction are higher than in 1968.

Welfare rolls, too, are larger. And, with few exceptions, relations between minority communities and the police are no less hostile. In short, the expressions of sympathy and concern that the Kerner report elicited from so many of those who, publicly and privately, govern America, apparently did not signify that they were willing to take the drastic action necessary to make American cities livable again.

But if the material conditions of the ghettos, the barrios, and the white working-class neighborhoods of the inner cities are still cause for discouragement, the state of mind on the streets is cause for some hope. While for you it might be the source of some fear, I find hope in the fact that people are angry--perhaps even angrier now than they were four years ago. The difference is that their anger no longer seems to be the helpless kind that finds expression only by smashing and burning. We hear in the

streets today only a little talk about violent destruction. Instead, the talk today is about a loss of faith in our system. For many, and this is disturbing, the new attitude is one of apathy or despair. And yet, at the same time, the new disenchantment has inspired a tough new kind of pride, self-confidence, and a sense of self-determination.

Minority folks want to be where it's happening, and they believe they know where that is and where they want to be. They demand to be a part of the decisions that affect their lives. They no longer believe that all decisions--in education, for example--must be made only by professionals in the academic world. They no longer believe the professional can do no wrong. Rather, they have great distrust in the establishment and all who work within it. Believe me, they question us all.

Now what do we folks want of you folks? I wanted to ask this question first, before someone else asked it, because if someone else asks it I get angry about it. I think it's a question that is horrible in the asking. What do you folks want? The answers are simple. Minority communities want the same things that majority communities want. We want you to assume the sameness of our humanity. We want secure and decent homes, the ability to feed and clothe the people who depend on us, protection in our old age. We don't want to be robbed or beaten in the streets any more than anyone else. We want the opportunity to develop, each and every one of us, to our fullest extent. These are not extreme requests. And frankly I can't understand why everyone else doesn't understand them. But obviously there are people today who do not.

Some Basic Assumptions

What do we want? We want change. And to describe the kind of constructive change I have in mind, I want to list a few basic assumptions that express my beliefs about the society in which I live. Perhaps these are my personal prejudices and biases, but here they are.

(1) I believe the human crises in our inner cities can be traced to a problem described by two words: human apathy.

(2) I believe that racism is at the root of our human crises, and that is a plain fact. Most people of the majority community basically believe that "people of color" be they black, brown, Puerto Rican, Oriental, Indian, or whatever, are inherently inferior to white people. I also believe that, if most people would recognize within themselves the truth in that assertion, we could then honestly start trying to seek solutions and do some real problem-solving.

(3) I am convinced that white racism will be increasingly met by black or brown racism, and by others colors of racism, as long as we as a nation retain our polarity.

(4) I believe that no answer for the human needs of urban areas of any long standing will come exclusively from either the core city or from the suburbs. Rather, the solutions must come, as the problems have, from a bewildering array of sources on both sides.

(5) I personally do not expect any real solutions in my lifetime, and I do not expect to expire today or tomorrow. I do not expect that the people who control things today will be willing to make the necessary commitments and sacrifices for the people who don't control things. I would quickly add that I'm willing to be proved wrong on this assumption, but I doubt that I will be.

(6) My final assumption is that we, as a nation, do have the capacity to develop and adopt solutions to the human crisis. We, as a people, can do anything that we want to. The difficulty is that we simply have not yet reached the point as a nation where we want to solve the human problems we face today.

If we are really going to do anything meaningful about our social problems, the earth sciences comprise only one area in which change will have to occur. Changes must take place in all our institutions and in all of us. We are going to have to recognize for what they are some of the horrible things we have done in the past. Perhaps that calls for "maladjustment" in our society. I never intended, for example, to adjust myself to the viciousness of a lynch mob. But as a young man I was forced to join a lynch mob and watch a man hang. I sure as hell never intend to adjust to a nation that talks about a society of equality for all as the dream of tomorrow, rather than as the reality of today. We sleep with dreams, but we live with reality.

Salvadore Carpio

Professor of Behavioral Science, Metropolitan State College, Denver

I would like to elaborate briefly on some of Senator Brown's comments, and also to make a point about the film we saw earlier. I am sure that as you looked at the faces in the film you noticed that there was not a black face, not a Chicano face, not an Indian face to be seen. In that respect the film says as much for itself as anyone can say about it.

As Senator Brown noted, Denver is much like any other large urban area (and indeed there is little in the urban environment, such as the pleasant streams and interesting rocks that we saw in the film, to encourage a minority child to begin looking toward the sciences or engineering.) The problems of the inner city are great, but they are shared by all. The problems of drugs, crime, pollution that the majority society is just beginning to address itself to first emerged in the barrios and ghettos of our large cities. As you take your trip this afternoon through some of the inner areas of Denver, I hope you will keep this in mind. And this as well: That you will be seeing the people who constitute the fastest growing ethnic or racial groups in the United States today.

What are our hopes? Education is one. It is our future. The film this morning alluded to the necessity of education and to the importance of the science curriculum in colleges. It is worth noting that only recently, since about 1960, has the education of blacks and Chicanos in urban areas become a significant focus of attention. And

for the most part that attention has been misguided. We taste the fruits of a lack of direction every day as we pick up the paper. I am sure you are all familiar with the continued confrontations, the walkouts, and all the other difficulties of the schools.

For blacks, Chicanos, and Indians our problem historically has not been one of getting into college so much as it has been a problem of getting out of high school. The challenge to you, then, is a great one. Obviously it is going to be very difficult to recruit minority students into college curricula when dropout rates from high schools are so high. If you are really sincere in your aims, then your commitment to bringing minorities into the earth sciences not only will have to reach the high school graduate, but will have to reach down to the junior high level.

It is going to have to be a commitment to broaden the experience of young Chicanos, blacks, or Indians everywhere. This may prove to be a painful commitment, and it certainly will be expensive. But as Senator Brown suggested, we can no longer afford to measure human lives in terms of money.

This conference is very important. But the mere fact that you are here will not be the measure of its significance. What will make this conference really important will be what you do afterward. This conference should not become just a good statistic or a good item to mention in your Equal Employment Opportunity reports, as is often the case. The real question now, as Senator Brown indicated, is "What are you going to do?"

Prof. James Skehan, S. J.,

Director, Boston College Environmental Center and President of  
the National Association of Geology Teachers

The success of minority recruitment into the earth-science and mineral-engineering professions over the next 20 years will depend to a large degree on a national commitment to upgrading the quality of science teaching, and in particular the quality of earth-science teaching, in secondary and, especially, elementary schools. In addition, success also depends upon whether minority groups perceive the geosciences as relevant to the more pressing needs of society.

Until now, virtually no one has tried to promote careers in the geosciences primarily on the basis of their role in solving the problems of society. To those who understood geology, this role always seemed self-evident. Fuels, water resources, and minerals, after all, are the very fabric of society. Nevertheless, some geologists may be surprised to learn that many people, among them leaders in our state, local, and Federal Government, do not understand the close relationship between the future discovery of natural resources and support of the geosciences. For the most part, geoscientists have never taken the time from their work to increase public awareness and understanding of the importance of the earth sciences. But it is becoming painfully clear that this is now part of our duty as scientists and as informed citizens.

I contend that earth scientists have much to contribute to solving the major problems of our day. Correspondingly, society as a whole has a stake in the quality of science teaching at the elementary school level. What is more, I contend that we geoscientists have an important stake in ensuring that the earth-science component of elementary education is upgraded, and that the image of, and relevance of, earth sciences be enhanced from a child's earliest days in school.

Currently there is a vanishingly small amount of such instruction in elementary school classrooms and laboratories, although this paucity is usually not premeditated. Traditionally, the geosciences have had a low profile in college degree programs for prospective elementary school teachers and, at least prior to the first manned landings on the moon, few teachers selected courses in earth science. Thus it should not be surprising that geologists are still widely portrayed by teachers as stereotyped eccentrics who enjoy pounding rocks with little hammers and lead burros through the hills in search of gold.

High-quality instruction in earth sciences is not entirely absent from elementary schools, of course. State geological surveys and the U. S. Geological Survey make important contributions through a variety of publications and by their support of museums. But the educational value of these excellent efforts is diminished in the sense that they usually provide only a one-shot introduction to the earth sciences and cannot provide the kind of follow-up support that is needed.

To correct this deficiency, we badly need support for programs of earth-science instruction for elementary science supervisors--perhaps from the National Science Foundation (NSF) or other federal agencies. A commitment from government is required to help in developing suitable instructional materials for children and in upgrading teacher-preparation programs. And at the same time, a commitment is required from the entire geoscience profession. Such a dual dedication would go far toward opening important job opportunities for minorities. Imaginative and relevant education are basic ingredients for minority participation in the earth-science and mineral-engineering professions.

There are precedents for such an effort. Geoscience programs at the college level have improved dramatically over the past 15 years as a result of assistance by the NSF. Moreover, earth-science programs in the secondary schools in many parts of the country have benefited considerably from such NSF-funded ventures as teacher-training institutes, the Earth Science Curriculum Project, the Earth Science Teacher Preparation Project, and the Environmental Studies Project. It is true, however, that with the exception of the latter two programs these efforts have not had an impressive effect on ghetto education, and their impact so far on minority recruitment for the earth sciences has been less than spectacular.

Along with support for improved elementary education, there is an urgent need for programs keyed to those who are unable to attend college full time, or who cannot attend at all. Government, industry,

educational institutions and professional geoscience groups must collaborate to develop new and imaginative approaches to programs for training technicians in natural resources or junior engineers. Such opportunities could be especially beneficial for underprivileged groups. As an example, a number of colleges and universities now offer courses in film making. Film institutes like the National Educational Television Training Workshop in New York are flourishing in a number of black communities. The NET students are mainly men and women who could not afford tuition at New York film schools. (As an aside, there are many still undeveloped opportunities for relating cinematography to the geosciences, as in the production of documentaries on subjects ranging from mineral resources to oceanography.)

Indeed, oceanography provides a good example of a field requiring the highest academic training for its scientists, but which also provides appealing opportunities for employment for persons with lesser training. The range of careers is as broad as the subject itself--from marine laboratory technicians with junior college degrees to deckhands on board oceanographic vessels who may have no college training at all.

The necessity for avenues of lower-level entry into the sciences is dramatically underscored by the available statistics on minority enrollment in advanced-degree programs. A study published by the Ford Foundation in 1969, entitled A Survey of Black American Doctorates, supports the widely held assumption that fewer than one percent of

America's earned doctoral degrees are held by Afro-Americans. Nor is the situation likely to improve in the near future. Another study in 1968 indicated that fewer than one percent of the men and women then enrolled in Ph.D. programs in the United States were black.

As for other minority groups, statistics are hard to come by, but there is no indication that their situation is any better. Not to be disregarded in this accounting is the status of American women in the sciences. During the period 1960-69, U. S. colleges and universities conferred a total of 154,111 Ph.D.'s, of which 17,929, or 11.6 percent, went to women. In the biological sciences women earned 14 percent of the Ph.D.'s, whereas in geology women earned 2.5 percent of the 2,143 doctoral degrees awarded. In geophysics, 3 of the 203 doctorates which were awarded, or 1.5 percent, went to women.

In summary then, the future visibility of the earth sciences-- and the importance which both teachers and students attach to these professions--will depend to a large degree on the vigor and dedication of earth scientists in making themselves and their profession known in the coming years. As a start toward remedying the problems of minority participation in the geosciences let me encourage every professional geologist to do something that many are already doing-- spending time equal to 10 percent of a normal working week in behalf of science-education activities, especially in association with secondary and elementary minority schools. Your activities may

begin with, and depend on, personal opportunities or contacts in the schools, but in many places local sections of the National Association of Geology Teachers may be able to play a coordinating role in developing field trips, laboratory instruction, lectures, or workshops. I would urge this commitment in the strongest possible terms.

Inner-city Field Trip

Agenda-planning sessions

Wednesday afternoon, June 7

Editor's note

At the end of Wednesday morning's formal session at the Colorado School of Mines, conference participants were given the choice of traveling by chartered bus on a "field trip" to Denver's inner city to meet and talk with students from predominantly minority high schools, or of remaining behind on the campus at Golden for informal group discussions during and after lunch.

Between 80 and 100 conferees opted for the bus trip, which took them into the inner-city neighborhoods surrounding Denver's East, West, North, Manual, and Lincoln High Schools. Here the conferees met informally for 3 hours with approximately 90 students, ranging in age from 15 to 18 and representing--in varying proportions--the city's youthful black, Chicano, American Indian, and Oriental populations.

The value of this experience for conferees was difficult to gauge, in part because of its highly personal nature and in part because much depended on the ability of individuals--adult and student--to strike a useful rapport in the short time available. Some insight to the way the field trip went is provided by this report from Richard Joko and Thomas Rodriguez:

"The inner-city field trip was planned to provide an opportunity for representatives of industry, government agencies, and colleges and universities to interact with minority students on a highly personal level. The trip enabled these people to find out for themselves what the students think and feel, both about the earth-sciences and

mineral-engineering fields, in particular, and about their lives and futures, in general. All too often students find themselves being spoken for by 'representatives' selected by adults. Our desire was to eliminate this 'middle man' and let the students represent themselves.

"The interaction began with a fried-chicken picnic in an inner-city park. After the picnic, some of the students and adults remained in the park to talk while others chose to take walks together and still others went on excursions through the East, West, and Manual high-school neighborhoods. To set the students at ease and to enable them to enjoy themselves, the students were asked to lead these activities. Students and adults mixed freely all during the afternoon. There was no evidence of student-adult segregation and both groups seemed to have had some very meaningful personal experiences with each other.

"At the same time (Richard Joko adds) the post-picnic neighborhood excursions were not as profitable as they could have been. For one thing, logistical problems developed. The buses ran late, and the drivers seemed unfamiliar with the route. Also, some students tended to lead tours of their high schools rather than foot excursions into their neighborhoods, a preference that lends a superficiality to interpersonal relations. Still, the kids were a pleasure to work with, and the students and adults who remained at City Park seemed to share some very meaningful experiences. Many of them dropped their facades and roles and got to know each other as real human beings."

The conference participants who remained on campus Wednesday afternoon gathered in eight groups of 10 to 15 persons each for two hours of conversation that had two main objectives: To help the members of this highly heterogeneous meeting take the difficult initial steps toward frank discussions with each other; and to elicit ideas--"hidden agenda items"--for wider discussion that might otherwise not have emerged in plenary sessions. In a sense, this was a "brainstorming" session with a social motivation.

Virtually all of the ideas expressed within these agenda groups are reflected in the recorded general discussions and in the reports of five Resolutions Committees of the conference, delivered at the conclusion of the conference on Friday morning.

Later Wednesday afternoon, the eight agenda groups convened as one in a campus lecture hall. The discussions that ensued, according to minutes by Jimm DeShields, of the University of Massachusetts at Amherst, raised the following noteworthy points:

Prisons--In seeking talented young men and women from minority groups for training in the earth sciences and engineering, the prison population should not be ignored. Geoscience instruction could be incorporated in rehabilitation programs. Nor should government or industrial employers discriminate against qualified trainees on the basis of a prison term honorably served.

An Affirmative-Action Program--Some minority conferees expressed irritation that industry and the professional geoscience societies had not evidenced a "real commitment" to minority advancement. Said one participant, "This group is going to have to put its money

where its mouth is, to develop an organization to do the type of things that private industry should be doing." Several participants active in geoscience societies responded that a program had been drawn up by the American Geological Institute and the Geological Society of America (a description of which appears later in this report) and that financial support was now being sought from private foundations, industry, and professional societies. The hope was expressed that the conference would provide important guidance in the implementation of this plan.

--Ed.

Plenary Session

Wednesday Morning, June 7

Rev. Jesse Jackson,

Director, Operation PUSH, Chicago

It seems to me that one of our fundamental problems in this conference is simply talking about minorities in the geosciences. In one philosophical sense, we are a minority only on the presumption that numbers are the sole basis for determining majority and minority. If you follow that premise, then you are philosophically in the school of thought that "might is right." I am opposed to that because I know that the strong can be wrong. Rosa Parks was a numerical minority, but she was an historical and moral majority. To that extent, I think, we have to broaden our appreciation of what is a minority and what is a majority.

In a hospital, for example, the patients represent the majority of the sickness and the problems. But the doctors, who represent the minority of the persons, represent the majority of the solutions. If we understand that all of us bring something to the banquet table, and should not hide behind our skin color for support, nor use it as a basis for condemnation, then we can begin to look horizontally across at each other rather than looking vertically up at, or down at, each other.

It is significant to me that conferences like this are often used as great diversions. For people spend a lot of time talking more and more about less and less than they, in fact, have the authority to do. For example, I heard someone say earlier today that persons here represent companies who in turn represent a

substantial portion of the Gross National Product--collectively perhaps, as much as \$30 billion. But the question is not how much power do you represent to resolve the problems. The question is how much power do you represent that is available to solve the problems? I passed the state house today and I saw a lot of gold up around the "tombstone" over the capitol. I call it a tombstone because a lot of dead legislation comes out of there most of the time. And a lot of gold exists there. Timed diversions can absorb some of the best minds, and play with them, and stimulate them, and yet do nothing. It is like exciting a eunuch. His excitement has nothing to do with his capacity to respond.

Some of us want to be simplistic in our analysis and escape the depth and breadth of the crisis, and say that we just have a racial crisis, we just have an urban crisis, or we just have a crisis in the sciences. So you run out here in this luxury, up under these mountains and under God's soft, great sunshine trying to solve a problem that is going to save a finger on the national body. But I suggest to you that there is a civilizational crisis--and, that you cannot escape any phase of it, because whatever affects one group directly, affects everybody else indirectly. You could have a cancer of the toe, but it affects every part of the body. And in one sense, the cancer in the geosciences is just an evidence of the cancers that run right across the spectrum of American education.

What did I mean when I said civilizational crisis? There is a black-white crisis now; there's a black-white-brown crisis. There is a labor-management crisis--strikes in some areas have taken longer and longer to solve, and there is more bitterness at the end of the strike. Seventeen million organized laborers are in a freeze, 60 million unorganized laborers are in a deep freeze, 10 million unemployable people are in a subarctic condition under the present economic arrangement. A school crisis: in Philadelphia, New York, Chicago, Los Angeles, the schools are full of dope, guns, and liquor. Where the prayer goes and the dope comes in, where the information goes out and the hope goes out, the best minds are drained off.

And so you who are here cannot afford to waste time. If you work for a great company, and you walk around with a badge on saying you represent it, you can say things here, and things will happen. If you work for it, you're talking about what you wish would happen, and you're not as close to the Board as I am.

Therefore, don't deceive yourselves. It would be as if I walked around saying that I represent the church because I am a preacher. I am a preacher that represents a conviction; I cannot speak for the church. It would be dishonest to pretend that I could.

This civilizational crisis is heightened by the locking out of available, talented people who have the ability, and the capacity, perhaps, to save the civilization. This civilization, by attempting to lock out major efforts toward the process of democracy in

Mississippi, has simply heightened the crisis. The attempts to lock out DuBois, to lock out Paul Robeson, to lock out Malcolm, to lock out Martin King, to lock out Angela Davis, the attempts to lock out Caesar Chavez--these just accentuate the civilizational crisis.

Now, I'm just a country preacher, but I hope this makes sense to you scientists. So far, black progress has not been in proportion with black preparation. That is the problem. We were ready to play baseball before 1947, we were ready to sit in front of a bus before 1956, ready to use the bathroom in downtown America before 1964, ready to vote before 1965. Black progress is not in proportion to black preparation. That's why the issue is deeper than education. There are blacks with talent who cannot express themselves because of racism.

Neither is black progress in proportion to white goodness, or to liberal appreciation and toleration of us. Because black progress has not been made as a result of white goodness, but has been made by black assertion. You show me the goodness of an Abraham Lincoln; I will show you the prodding of a Frederick Douglass. You show me the goodness of a Franklin D. Roosevelt; I will show you the prodding of a Mary McCloud and a Randolph. You show me the goodness of a John Kennedy; I will show you the prodding of a Martin Luther King. So, history says to us that black progress is not in proportion to black preparation, not in proportion to white goodness, but rather in proportion to our own organization.

That is why our assertion cannot be expressed in high style; it must be asserted in life style. That is why we can no longer prove our worth on the basis of over-developed motor skills--on how fast we can run, jump, or throw. We must now move to prove that our brains, our cognitive skills, are in proportion with our calves, our ankles, our biceps, and our triceps. We are total human beings. Whatever we have been in the stadium, we can be in the laboratory, if we have the opportunity and if the emphasis is there. If our schools are first class, our brains will provide just as many thrills. We don't need conferences or studying.

With opportunity we can rise to the top. That's why I can't go along with our being a minority, minority in what? In genes, in chromosomes, in hair, in thought?

A problem at another level is that we are without a plan for getting blacks into the geosciences. If there are 30,000 people in this field, and if we are to have the 3,000 blacks that we should have, the 1,500 Spanish-speaking people we should have, the 120 American Indians that we should have, there is no reason not to achieve that within 5 years.

We're talking about a plan with a money emphasis to train 600 to 800 black, brown, and Indian geoscientists a year for the next five years, so that we will catch up. Now that we are in an economic era, the notion is no longer do we deserve it, the questions now are profit-loss, asset-liability, short-term long-term. Is it more advantageous for us to be developed than

it is for us to stay undeveloped? Do not developed people cost less, and do not developed people contribute more? Is it good business to develop one's mind? A man with an undeveloped mind can pick up a brick and in it he will see destruction, and throw it. A man with a developed mind will pick up a brick and in it he will see construction, and lay it. The difference is not in the brick but in the developed mind. The developed mind will walk through a field and see oil, the undeveloped mind will see grease and water. That developed mind is the difference.

There are 25 to 30 million black-Americans counted. That would make us the second largest black nation on earth, second only to Nigeria, and more than Ethiopia. Who are we? Black America is a \$42 billion a year gross national product, the 16th richest economy in the world, richer than any black nation in the world.

I am suggesting that in 1965 we went to Alabama with no black officials. Today we have 106; 2 in the state legislature, and we'll have two from there in Congress by 1974.

In Washington, in 1965, we had three black Congressmen. Today we have 13, and by November we will have 20. We went to Selma with 400 black officials. Today we have 2,100, plus a United States Senator.

I am suggesting that the revolution in America may take a strange form. It may not have to do with blood; it may be the development of minds, and increased citizen participation. Because it is clear to me that the hand that picked cotton in 1964 can pick presidents in 1972--and that is revolution.

As I close, I hope you have some appreciation of the need for the solid interrelating of black institutions and black brain-power with enlightened white people. Black people, joined in coalition with the white people who have that perspective, can save the nation. Without this coalition, the long night of violence will not let up.

General Discussion

Thursday morning, June 8

10 11

James Frazier

Director of Civil Rights, Department of Transportation

At one o'clock this morning a group of us were discussing various aspects of the Federal Equal Employment Opportunity Program. It was quite obvious to me that there was a great deal of misunderstanding, and a great deal of no understanding, concerning the subject. Just as we were about to break up last night, the one lady there said that she had never heard of the Federal Women's Program. This came as a surprise to me because I thought everybody had heard about the program. So I thought that I had better review the Federal Equal Employment Opportunity Program, although I can only speak to you from the time beginning in 1969, when I began working for the Federal Civil Service Commission as its Director of Equal Employment Opportunity.

However, let me say that I guess I carry a few prejudices against private industry. When I came out of undergraduate and graduate school, I couldn't get a job in the private sector, especially United States Steel, and so I went to the Federal Service. I've been with the Federal Government off and on ever since. I suppose that's the reason I feel that the Federal Government has been a leader in this area of civil rights and equal employment opportunity. It has been about the only salvation for many minorities. But I'm not here to tell you that it's been all that great, because in those days minorities worked

mostly in the Treasury and some parts of Defense and certainly in the Post Office--but in very low grades. That is what the civil rights program and equal employment opportunity program is all about, opening doors and new opportunities for minorities. Progress has been made.

At present, the Federal service employs about 2.5 million people. About 20 percent, or roughly one-half million, are minorities. The closest private employer in terms of size probably is American Telephone and Telegraph with about 2 million employees and a minority population, as far as I am able to determine, of about 10 percent. So, in this respect, I would say that we are somewhat of a leader in this area.

You heard Jesse Jackson last night, and you heard Senator Brown and others. They chastised and criticized. Some set their own priorities and their own goals in terms of what the major problem is today. In my opinion, I still think it's employment. Without having the opportunity for gainful employment, minorities will never be able to break the cycle of inferior education, poor housing, and poor health conditions. Certainly, we don't even talk about preventive medicine and health care unless you have that nasty old stuff, as Jesse said last night, called dollars. We have to have money, and that is why I harp back to the issue of employment, gainful employment.

I would like to give you a brief historic review of what has transpired in the Federal service since the late 1930's with respect to employment opportunities. At that time the NAACP, Mrs. Franklin Delano Roosevelt, and former Mayor LaGuardia of New York, threatened a mass march on Washington, D. C. to press for federal legislation or an executive order prohibiting discrimination in Federal employment. Shortly thereafter, in 1941, President Roosevelt signed Executive Order 8802, basically forbidding discrimination because of race, creed, color, religion, or national origin. It was a policy statement. Sex was not a part of that order.

Each succeeding President has done exactly the same thing, although it was not until about 1960 that President Kennedy issued an executive order moving the Federal service from a position of policy statements against discrimination to one of affirmative action. Mr. Nixon issued Executive Order 11478 on August 8, 1969, and we like to believe that it is the strongest one so far, in that it addressed itself to some of the weaknesses of the existing program.

The order [paraphrased] said, "Utilize the present skills of each employee to the fullest." Of course, there were too many people who were underemployed in the Federal service. It also said, "Provide employees with the opportunity to enhance their skills." Basically, the intent here was to give them training.

The order further said, "Provide training and advice to managers and supervisors to assure their understanding of the policy expressed in the order." There are serious problems in this area. The GS-13's, 14's, and 15's are the people who are the backbone of the government and too often they fail to carry out their responsibilities in equal employment opportunity.

The next item in the order was a "Working, cooperative effort with the local community to improve community relations and conditions which affect the employability of residents of that given area." Basically, this means that, for example, if there is a transportation problem for people in the inner city of Denver, then it's not beyond the bounds for a good manager to try to work in his community to do something about the particular problem.

The last item provides a system for evaluating the effectiveness with which this policy is being carried out.

Now to bring you up to date, President Nixon signed into law on March 24, 1972, the Equal Employment Opportunity Act. This, in my opinion, opens up a new era both of commitment and expectation for government in equal employment opportunity in that it places certain requirements on federal agencies which will strengthen the EEO program. More than that, the law includes coverage of state and local governments which had never been covered before, and for the first time in the history of the Equal Employment Opportunity Program, it received its

authority from a statute rather than only an Executive Order. What's more, one new provision of the law accelerates complaint procedures. If a complaint is not settled within 180 days, a complainant can go to court to seek relief. Of course, that gives us the additional impetus to expedite our cases. Slowness in processing complaint cases has been one of the great weaknesses of the existing program. In some cases, we've had some people die before their cases were ever adjudicated.

The law also says that affirmative action must be meaningful. The law states further, that EEO action plans will be required to include: (1) training and education programs for upward mobility, and (2) establishment of qualification criteria of principal EEO officers.

If I have strayed away from what I began to talk about, I apologize. But I thought it necessary to give you a rundown of past and present attempts by the Federal Government to provide a method or means for hiring minority geoscientists.

Let me talk for a bit about Upward Mobility Programs, which I think really go to the heart of this conference. When I came to the Civil Service Commission, I concluded that our greatest problem was moving minorities up through the system and giving them the opportunity to level off somewhere but certainly not to be impeded by their skin color or national origin. Part of the problem is identifying those minorities who are qualified and quite capable of taking on additional responsibilities. Often times managers do not see potential in their employees.

Agencies are not required to develop an Upward Mobility Program. Most of them have a program of some sort, but it is not uniform. For an example, the Agency for International Development has taken 30 young people from GS grades 1 through 7 and said "If you can cut the mustard, we will send you to George Washington University." Twenty-nine of them (they had one drop-out) are now going to George Washington University full time at the government's expense.

The Department of Health, Education and Welfare has a tremendous program. They are dealing with four colleges in and around the Washington area, basically doing the same thing, that is, providing the opportunity for employees to acquire a college education. A number of employees there are working four hours a day and going to school four hours a day. It is not easy, but they are doing it. It is a way of moving people in and through the system, and I believe that we can do exactly the same thing in the earth sciences if we are really serious about moving minorities and women into this field. I am sure it will take a long while, but at least it will be a start. The avenue must be provided for those employees willing to travel that avenue which will lead to a better life.

Leon Cook

President of the National Congress of American Indians

In Indian country our problems revolve around water, property, and natural resources. Unfortunately, most of the activities related to those areas of interest have, in the past, been administered, maintained, and operated by non-Indians, primarily whites.

Most of you may know that Indian country has been diminishing in size for some time. In 1900, for example, we had approximately 94 million acres of property. Today we have 44 million acres. We lose an average of 50,000 to 500,000 acres a year to non-Indian interest, and only because the Department of the Interior, the Army Corps of Engineers, private and corporate interests have all, for years, been encroaching on Indian resources, water, and property. As a result, we Indians urgently need our own people in the natural and physical sciences--we need hydrologists, geologists, land-use planners, real-estate managers, real-estate appraisers, biologists-- anyone associated with land, water, and their natural resources.

President Nixon gave a message to Congress on July 8, 1970. He talked about Indian self-determination. But self-determination, in my mind, has nothing to do with getting a lot of Indians at the top of that Bureau (of Indian Affairs). But getting Indians running, operating, and administering our water and property resources at our reservations is important, because it is there that we are fighting for survival as a culture and a people. It is there that we maintain what it is we have left of our land, water, and resources--human, natural, and physical.

We need all kinds of human resources and especially Indian natural-resources specialists. We are trying to build that kind of human wealth at our reservations. We want to retain and maintain our reservations.

If you look through the past, at every river basin in this country--the Arkansas River in Oklahoma, the Rio Grande in New Mexico, the Colorado, San Luis Rey, Columbia, and Missouri River Basin--you see in every case expropriation of Indian lands and waters. The Federal agencies are competing for Indian resources on the one hand, and the corporate interests are competing on the other. And we end up the losers. We have lost forests, minerals, gas, oil, land, water. You name it, we have lost it across this country. So, in Indian country, we are interested in this kind of conference. Hopefully, your professions, your companies, and your agencies will help this country, help Indian country, and help the whole world to demonstrate that there is some sense of humanity in this country, some sense of morality, and some sense of justice for our Indian community.

We are interested in jobs, in income, in education, in welfare. We are interested in roads. We know the things that are available in urban communities. But what is unavailable in urban communities is an opportunity for us to survive as a people and as a culture. We are the only aboriginal culture in this country. What we have left in reservations is the last of our birthright in this country. In those reservations you find who

it is that I am. And I am not only an Indian, but a Chippewa. I am not only a Chippewa, but a Redlake Band Chippewa of the Redlake Chippewa reservation. That defines who I am, and among all other Indians the land defines who we are and how we relate to this country.

We used to go through these hassles when I was in the Bureau of Indian Affairs. Our budget examiner used to say, "Why are you so adamant about hanging onto your reservations?" I said, "Look, I don't know whether you are Irish or Scotch but whichever you are, Ireland and Scotland still exist. But what happens when those countries are no longer in existence? When they are terminated as you terminate our Indian people, then what do you become? Very literally an American, a nameless, faceless American. What do I become? What do my children become when I am terminated?"

So we do need help and we are asking for your assistance. We would like to survive as a people. We would like to retain and maintain our reservations. We would like to have more kids in college--we have 14,000 this year. Now if they were all training in natural resources fields we would take over the Bureau of Indian Affairs, but they are not studying natural resources.

J. R. Jackson, Jr.

Manager, Exploration Environmental Affairs, Exxon Company

It is a great pleasure to be here today to participate in this conference in my role as Chairman of the American Geological Institute Committee on Manpower. In the short time available, I would like to present the results of recent studies made on the supply and demand for earth-science professionals.

Two comprehensive studies have been made by the Committee on Manpower. One estimates the supply and demand for earth scientists at the end of 1968, and one at the end of 1969. Each is based on the current employment of earth scientists, and each projected the results five years into the future.

Results from these studies indicate that total employment of earth scientists will increase 3.4 percent from 1969 to 1975, or from a total estimated population of earth scientists of 36,500 in 1969 to about 37,800 at the end of 1975. The greatest percentage growth in this period is expected in the employment of geophysicists.

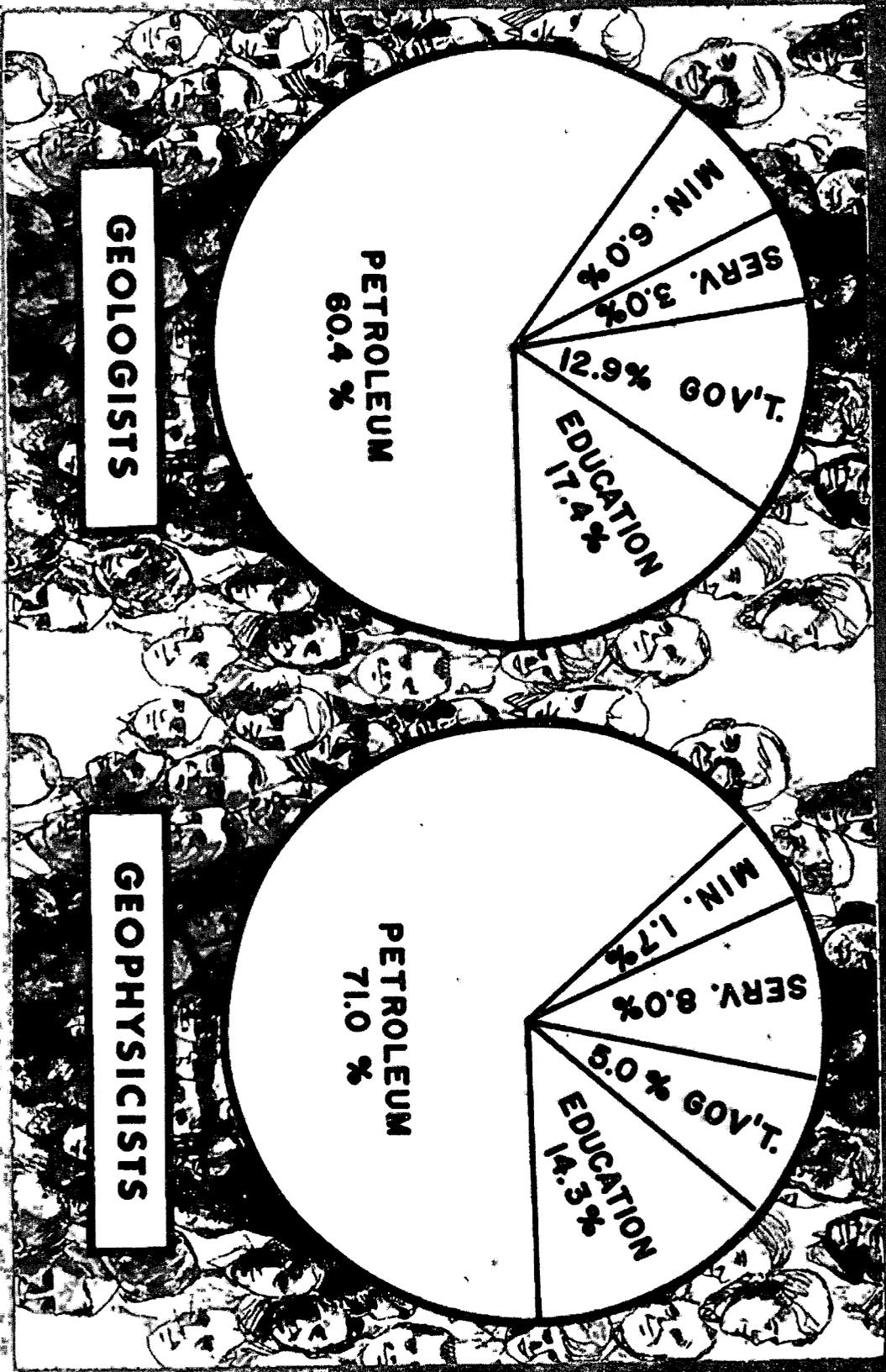
The study represents the results obtained from reports of employers of earth-science personnel and indicates their best judgment for new employment during the period 1970-75. Figures are based on responses to questionnaires sent to industrial organizations, governmental agencies, and educational institutions. Two hundred sixty-eight replies were received covering the entire spec-

trum of large and small employers of many different types. Results of these studies have been recorded in the AGI publication, Manpower Supply and Demand in Earth Science, available from the American Geological Institute in Washington, D. C.

Until recently, the total population of earth scientists in the United States was unknown. Only marginal information was available as to how these individuals were employed, by whom, and in what capacity. We knew very little about estimated future employment or emerging new trends and usage in employment of earth scientists. The objectives of the 1969 AGI study, funded in large measure by the National Science Foundation, were to improve these data; to indicate the employment outlook; to identify emerging trends and new usage for earth scientists; and to suggest means to dampen the cyclical character of employment in the earth sciences.

As you can see, the first slide illustrates the distribution of employed geologists and geophysicists who comprise the largest group of earth scientists. The petroleum industry employs some 60 percent of all geologists and 71 percent of geophysicists. The next largest employer category is that of education, with 17 percent of the geologists and 14 percent of the geophysicists. Government agencies employ 12 to 13 percent of the geologists and about 5 percent of the geophysicists, while service organizations employ about 8 percent of the geophysicists.

# DISTRIBUTION OF EARTH SCIENTISTS 1970



**GEOLOGISTS**

**GEOPHYSICISTS**

**BY EMPLOYER AND DISCIPLINE**

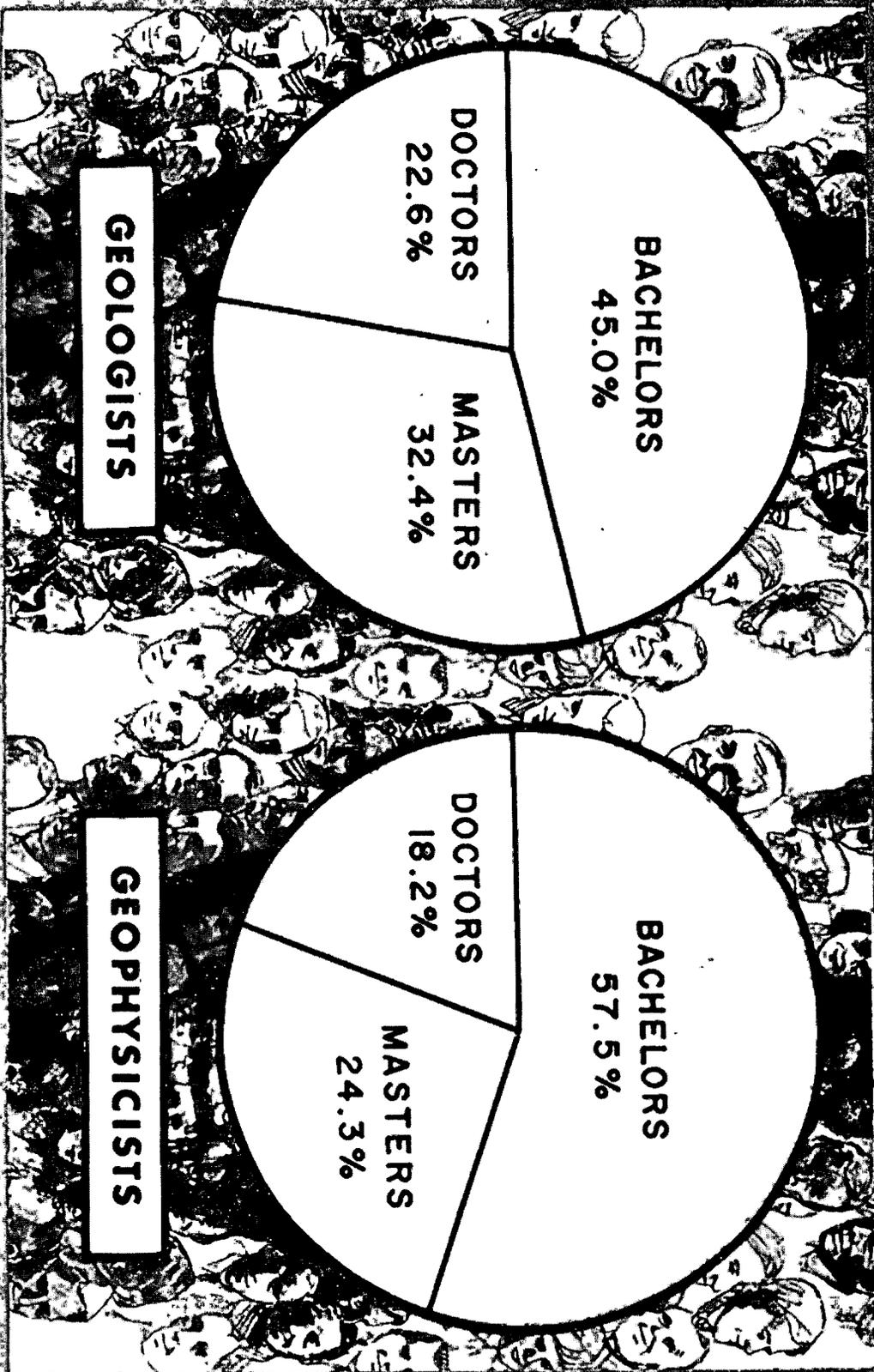
Looking at the distribution of employed geologists and geophysicists by discipline and degree, we find that bachelor's account for 45 percent, master's 32 percent and Ph.D.'s 23 percent of the geologists. With the geophysicists, bachelor's account for 58 percent, master's 24 percent and Ph.D.'s 18 percent. There is nothing very surprising in these figures and their distribution might have been anticipated.

Next is a distribution by employer and degree for four major categories. This shows that in the petroleum industry, holders of bachelor's degrees represent the largest percentage followed by master's and doctor's. In the educational field, as might be expected, holders of doctor's, master's, and bachelor's degrees are in that order. In government, there is somewhat of a surprise. Bachelor's are first, the master's are second, and the doctor's are third. For the total of all employers, the bachelor's comprise slightly over 51 percent, master's 28 percent and doctor's 21 percent of all earth scientists. This is how things stand today.

In the future, our studies would suggest a steady, but gradual, upgrading of the degree level.

Responses from questionnaires indicate that many factors can rapidly influence employment. Highly influential among these factors are government actions related to extractive industries, some of which may be legislative actions, administrative actions, or rules and regulations by state and local agencies. The economic vitality of the involved industries is a vital factor, and recent

# DISTRIBUTION OF EARTH SCIENTISTS 1970



**GEOLOGISTS**

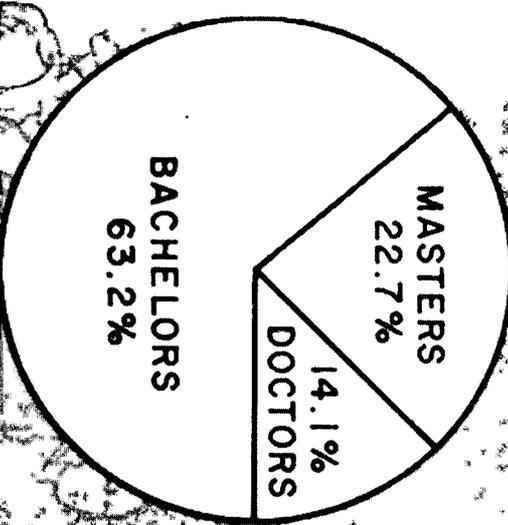
**GEOPHYSICISTS**

**BY DISCIPLINE AND DEGREE**

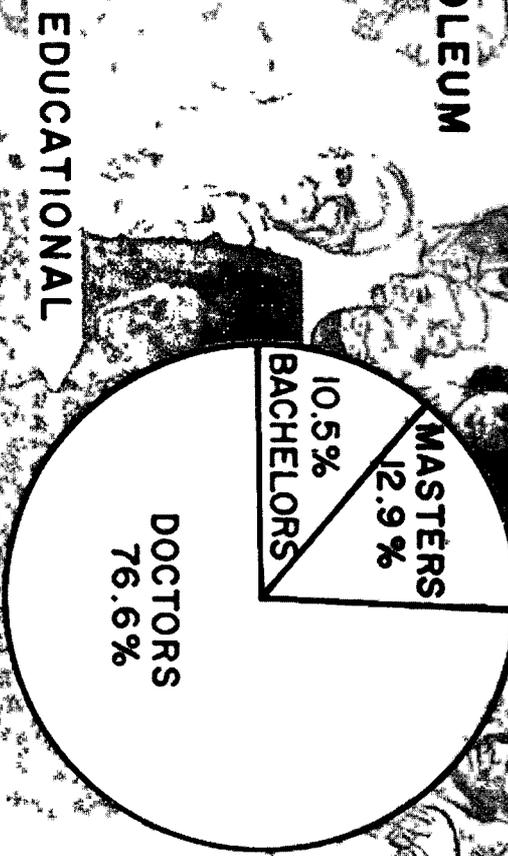
# DISTRIBUTION OF EARTH SCIENTISTS 1970



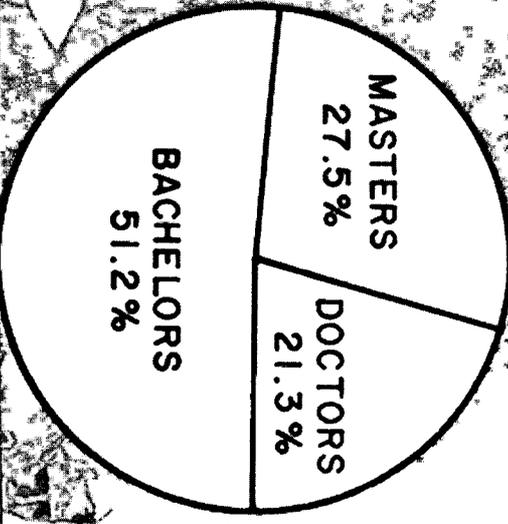
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BY EMPLOYER AND DEGREE

environmental activities and pollution problems are having substantial effects--both positive and negative--in employment opportunities.

One key factor, as yet unquantified, is the demand for earth-science teachers, particularly in the secondary schools, but also in colleges and universities. In many respects, this is due to recent excitement generated as people learn of the importance of geology and earth science through news coverage of the Apollo moon voyages, the results of the JOIDES program and its deep sea drilling activities, and the new ideas concerning continental drift and sea-floor spreading.

This is all coupled with a new and greater "people involvement" and concern with all activities that impinge on the nation's social conscience. Primary, among all of these, is the awakening and deepening knowledge of the short supply and rapidly increasing demand for extractive industry products, such as minerals and fuels of all kinds, including oil and gas, uranium, coal; and oil shale.

Our studies also identified a number of problems in earth-science employment. Some of these are the long lead times required to obtain master's and doctoral degrees, which many employers now consider mandatory. Another significant problem is the feast-or-famine employment cycle in the earth sciences. This is almost entirely due to economic conditions as the industrial economy expands or contracts. This situation is

aggravated by tax and accounting procedures which place exploratory activities--the major reason for hiring earth scientists--in the accounting category of expenses. Expense activities usually suffer first when low economic activity occurs or is anticipated.

Domestic political problems of all types also affect earth-science employment by industry, because in many cases political activists have no constituency among employers of earth scientists. They therefore feel free to attack industries at will without harming their own political position.

Finally, one of the most important problems is a divergence of views between educators and employers. Employers, as a rule, are constrained by the necessity of responding to the needs of shareholders, management, and regulatory governmental agencies. Educators, on the other hand, do not have these constraints and are possibly more inclined toward the theoretical, toward long-range research, or to a strictly scientific view.

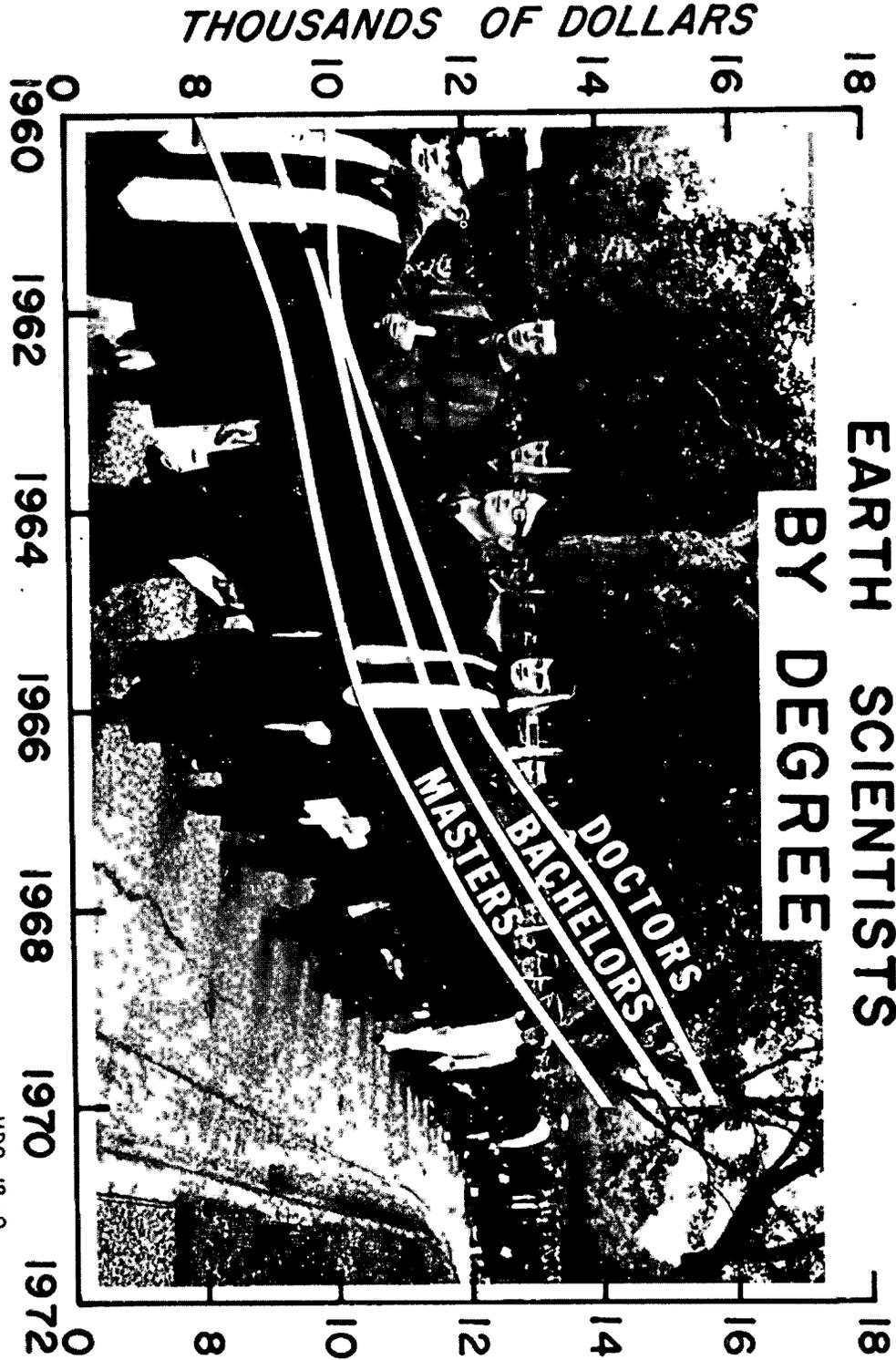
The wealth of information obtained from the questionnaires points to trends in training in qualities of individuals most desired by employers, and in the ways employers respond to, and utilize, employees.

Generally, it was indicated that employers prefer to develop and advance employees internally. They see a growing importance of physics, math, computer modeling, and systems analysis. And they prefer individuals with broad educational training and with the ability to adapt to change--with an emphasis on environmental considerations.

The master's degree is the preferred level for general operations, a Ph.D. is preferred for research and development activities. Of course, the opportunities available to master-level graduates far exceed the opportunities for the Ph.D. Employers speak highly of broadly based graduates with an ability to think imaginatively and to write and speak clearly in order to properly present a point of view. Probably as a result of interest generated by the AGI publication "Investigating the Earth," there is an unquantified but substantial need indicated for earth scientists as teachers in secondary schools. The early exposure of youngsters in secondary schools to the principles of earth science bodes well for future interest and involvement of citizens in the geosciences.

Finally, let us take a look at salaries. We have two graphs of median salaries, although these are not based on the AGI surveys but on the National Science Foundation's National Register of Scientific and Technical Personnel which now, regrettably, has been discontinued. First, I would like to talk about median salary levels by degree. The first chart indicated that Ph.D.'s have the largest salaries. Bachelor's are next and surprisingly, the master's--the group greatest in demand--has the smallest median salary. However, we attribute this to the fact that bachelor's are a significantly older group with more experience, and we feel sure the master's salary will surpass the bachelor's in the near future.

# MEDIAN SALARIES EARTH SCIENTISTS BY DEGREE

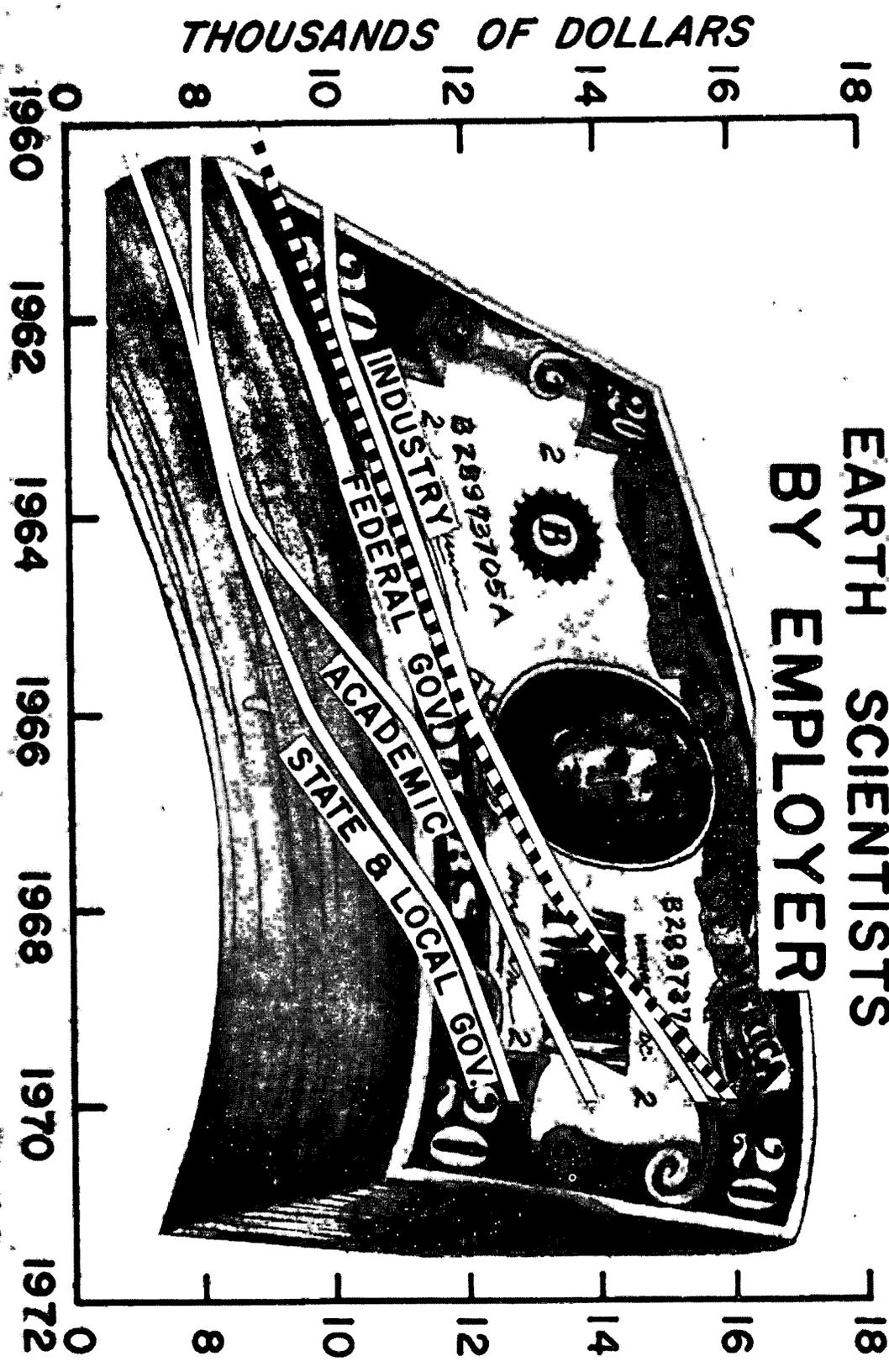


HDO 18-0

From the next chart we see median salaries paid by different employers. Possibly destroying some long-held beliefs, we find the Federal Government is now the leader in salaries, according to data from the National Register. Industry is second and academic salaries are third, while state and local salaries are fourth. We suspect that academic levels are probably equivalent to industry and the Federal Government; however, they appear anomalously low. Our interpretation is that in many instances, salaries have been reported for an academic rather than a calendar year. The inclusion of many high-school teachers and geographers who normally do not receive the college-level salaries may also tend to depress the median academic salary.

Let me summarize my remarks with these observations. These apply to everyone, not just to minorities, but they may be doubly important for minority candidates. The outlook for earth-science employment is not considered to be highly favorable for a number of reasons. From our studies, we anticipate replacement of attrition, in addition to some small growth, of approximately 3.4 percent per year through 1975. However, we see a substantial demand for secondary-school teachers which we have not been able to quantify. Of course, there are always employment openings for those who are highly qualified, for those who are interested and dedicated, and for those who are willing to avoid professional obsolescence.

# MEDIAN SALARIES EARTH SCIENTISTS BY EMPLOYER



Generally, these opportunities will be offered to graduates of the better institutions. There is one overriding consideration from the viewpoint of employers, and that is quality. We are dedicated to the proposition that quality is required to achieve initial employment, success, and advancement. The competition in today's world is keen.

Above all, we believe in creating an awareness of earth science in secondary schools which, when broadly disseminated, will lead to those highly dedicated and qualified individuals that we seek.

Edward E. Shelton

Director, Office for Equal Opportunity, Department of the Interior

Thank you very much. I have been sitting like a sponge for a day and a half, absorbing all kinds of statistical data, some that gives me cause to wonder whether I am hearing correctly. I am happy that the first item on the list of Action-Planning Sessions tomorrow concerns the motivation of minority youths of pre-college age to study geology and related sciences after they leave high school. I need not repeat the dismal statistics on the lack of minority involvement in this field. Most of you know the situation better than I.

In one recent publication prepared by The Geological Society of America's ad hoc committee on minorities, I read the following: "Increased minority participation is a challenge that can only be met by the combined efforts of the geoscience profession, the mining and petroleum industries, federal and state agencies, colleges and universities."

When I read this statement, I had the feeling that something was missing. Then I realized that the missing ingredient was the role of the family in this process. The whole crux of the problem as I see it is one of educating disadvantaged young people to become earth scientists. Let me admonish you that educational opportunities by themselves offer little to those whose family and community place little or no premium on what can be tomorrow--because it is concerned solely with what is today.

Specifically, what I am saying is that the home environment will determine, in large measure, whether or not we will be able to motivate minority young people to set as their goal a career in the earth-science field. It is unlikely that these young people will come into personal contact with members of their ethnic group already in the geosciences. Who is there to emulate?

What is more, the black community, the Chicano community, and the Indian village have grown tired of bright promises that are never kept. One more promise of a bright career--if only they will do thus and so--is not likely to create a stampede toward a career in the earth-science field on the part of minority group members. Let me hasten to say that I am not saying these things to criticize the program, but rather to alert you to the depth and breadth of the work to be done after this conference.

Motivation is a key element to success in any minority input program. And it can be destroyed by what I call "self-fulfilling prophecies" of low expectations: that we can not expect too much from these people; that their brains are too small to absorb the kind of training, and sustain the study required for entry into the earth-science field; that only 15 percent of the Chicanos graduate from high school and only two percent of those go on to college, so why work so hard to involve them in the program. I call this the self-fulfilling prophecy syndrome. We do not expect too much and we do not put forth much effort to produce the end result, because we consider the effort a failure from the start.

When one involves himself in any uplift program, one must be certain that negative feelings do not give one away. Minority people have become expert in reading "Mr. Charlie's" body language, and rightfully so. They have had many years to perfect this art. Whereas I do not wholly subscribe to the theory that only Chicanos can relate to Chicanos and only blacks can relate to blacks, I do feel that it is going to take persons familiar with the customs, traditions, and codes of minority group life to make this program do what we intend.

To do this, one must know what moves people to affirmative action. Using this knowledge we must capture their emotions and create within them the desire and the drive to move in a completely foreign direction. This desire and drive might be akin to the adventuresome spirit that motivated the 19th century pioneers to relocate, to seek their fortunes in the unknown western portions of the United States.

In short, we have to kindle a spirit in the minds of minority group young people that will impel them as a group to consider a career in the earth-science field. This means that we will have to package our program in such a way that it appears to be an extension of the present life style as opposed to the abrupt departure that it is. For fear that some of you do not fully understand what I am talking about, let me give you an example from my personal experiences. I was reared in a community in which few blacks had the opportunity to go to college. In those days there were

distinct jobs for blacks and whites in my city, and you did not find many blacks performing the jobs reserved for whites, or vice-versa.

Since I had held several of the jobs reserved for blacks, it goes without saying that I had many friends in this category. But when I went to college a sort of coolness began to develop in my relations with these fellows. They began to treat me in a manner that made me feel that I was not as tight with the group as I had been.

It appears that groups have a way of excluding those who deviate from the norm; thus, in trying to motivate minority young people to flee the nest, we must recognize that we are, in essence, requesting that they be prepared to accept a change in peer group, and in relations with their old peer group.

Those of us who seek out these young people must be assured that the ones we do find have the strength and the stamina to withstand this cutting of the umbilical cord. This means that we must provide the services and resources necessary for a successful bridging of the gap. Because in this dog-eat-dog society, only the strong survive.

Linn Hoover

Executive Director of the American Geological Institute

I think this Conference on Minority Participation in the Earth Sciences and Mineral Engineering is evidence in itself that earth scientists are concerned about the low level of minority group representation in their profession. It wouldn't be honest to say that all earth scientists share this concern, but their support of and representation at this conference indicate that the goal of increased minority participation is shared by the leadership of key earth-science organizations.

The scope of the task at hand is perhaps revealed by the data from the 1972 American Geological Institute (AGI) student-enrollment survey. These data (which were tabulated only on Monday and are not yet complete) are the results of a questionnaire that was sent to about 470 degree-granting departments in the United States. A response from 400 of those departments showed that 171, or 43 percent, had a minority student enrollment. At the undergraduate level, these 171 schools reported 374 minority group persons as majoring in the geosciences. There are 123 in the master's programs and 41 at the Ph.D. level, for a total of 538 minority group members in earth-science education. I do not have the current year's total student enrollment, but for the preceding year, the total enrollment was about 25,000. So, if that number still holds for this year, it means that the percentage of minority group members enrolled in earth-science programs

is about 2.2 percent. You may also be interested in a few of the totals by minority group. Out of the 538, 153 are black Americans, 208 are Spanish surnamed, 159 are Oriental, and 18 are Indian.

Last year, minority group members received 69 degrees in earth science; 51 at the bachelor's level, 18 at the master's level, and none at the Ph.D. level. The total, in comparison to the overall degrees awarded last year, was 1.7 percent of the bachelor's degree, 1.9 percent at the master's degree, and no Ph.D.'s.

The 20-odd national earth-science societies constitute the best available mechanism for focusing the concern of earth scientists on the need to increase participation of minority group members in this field. Collectively, these societies represent about 80 to 90 percent of all U. S. earth scientists, and most of them have a stated interest in professional as opposed to strictly scientific affairs. Six of the 18 societies affiliated with the AGI already have expressed their support for an inter-society program that would help increase the number of earth scientists drawn from minority groups. In most cases, this declared support will be in the form of cash from society members or drawn from other resources of the society. We consider it to be seed money, which though small in comparison to the magnitude of the funding needed to complete the job or even to undertake the job, will serve as a demonstration of the professional commitment--and we hope as an inducement--for more substantial financial support from other sources.

The Institute itself has requested some initial funding from a private foundation and I learned, just yesterday, that its support is virtually assured. The program that this money might help us to begin to implement has been initially sketched out by a composite committee of the Geological Society of America, and AGI, including many of the people here: Bill Bromery, Mack Gipson, Lou Pakiser, and Clyde Wahrhaftig.

The program is focused at the moment primarily at the college level. It would include such things as career guidance; counseling for returning veterans; and the provision of scholarships for both undergraduate and graduate students. The scholarships for undergraduates would go primarily to the colleges with large minority enrollment, particularly black colleges, if those colleges have an undergraduate program in earth science. At the graduate level, perhaps out of necessity, scholarships would be directed toward primarily white institutions.

One of the programs that has been proposed, for example, is the retraining of black agricultural faculty members in land-grant schools where agricultural training is diminishing. The black faculty members formerly teaching agronomy are scientists in their own right, although not earth scientists. With a year or so of additional training and some field experience, they surely could be prepared to teach undergraduate courses in earth science in schools that now do not offer this subject at all.

The program could also provide summer employment or summer field camp experience for undergraduate students who are interested in majoring in one of the earth sciences. Of equal importance is job placement, job counseling, and a follow-up program to make sure that those students who successfully complete a course in earth science are placed in a position that makes full use of their abilities.

These are only a few of the possibilities that this inter-society program might include. Probably you can think of other equally worthwhile and effective programs. We really haven't touched on the problem that some of the other speakers have already mentioned--the real problem of pre-college motivation in education. This is a problem in the training of earth scientists from any part of society, not just minority groups.

For the past several years, the Institute, through its Environmental Studies Project in Boulder, has been attempting to work primarily with students in inner-city schools--to create in them an awareness of the environment in which they are living, and the recognition that, as students, they have something to contribute to classroom discussion, and the potential of their own worth as adult citizens. Probably much more needs to be done at this level to make any program of college training successful. The composite program, even as we are sketching it out, will cost a lot of money. Probably at least a million dollars a year if it is to be at all effective, and perhaps ten times that amount.

Massive support must be sought from industry, government, and private foundations. And, again, we hope that the seed money that comes from the profession persuades some of these funding sources of the intent and the sincerity of the commitment of the profession.

It is probably not realistic to say that any minority group can attain a parity level of employment within the five-year period that has been mentioned. This would require that, within that period, 3000 to 5000 minority group earth scientists would be ready to go to work. If only because the time required for professional training is a minimum of 4 years, a more realistic goal is to say that we should set our sights on encouraging 100 to 200 minority group members each year to complete their training as professional earth scientists. I think it would be unfortunate to set a goal so high that it couldn't be realized. As Jack Jackson of Humble Oil pointed out, a crash program might cause unhappy effects.

I think there is no question that in the earth-science fields jobs would be available for several hundred minority group graduates each year.

"Panel Discussion, Youth, the Professions, and the Future"

J. V. Martinez

Research Physicist at the Eastman Kodak Company, Rochester, New York

Before introducing the Panel on Youth, the Professions, and the Future, I would like to make a few introductory remarks to try to give some insight into minority problems which have not been dealt with thus far. As I am outside the earth sciences, this might prove profitable.

My involvement in minority affairs began some time ago. I hope you will pardon my vanity, but I do want to give you some idea of my exposure to this area. At present, I am a member of the American Physical Society's ad hoc committee for minority participation; an officer and director of Minority Participation for Physics, which incorporated in Washington; a consultant to the Ford Foundation; and a consultant to the Atomic Energy Commission in this area.

By now, I suppose, we have accepted the premise that minorities want to participate in the majority society. Thus, our analysis has to be according to the way we have learned in the majority society. It is a bit unfortunate, really, that we have to segregate in order to integrate, but I think this is the way that things are going. In other words, right now there is a lot of external pressure to try to bring about participation. And it is too bad this could not have been done independently before now.

Perhaps this is a minor concept of the larger idea of participating in the majority society. It is a state of mind that we are talking about--a sharing of the American dream, to quote Congresswoman Shirley Chisholm, who says that it would be nice for the majority society to live its Sundays seven days a week.

I think she puts things in a good perspective: The object is to share the American dream with those who have been deprived, but not without an acceptance of responsibility.

The message I got last night from Reverend Jackson was that it is too bad we cannot use the methods of operations research to deal with this problem. We have all the machinery. The only question, as I see it, is where will the money come from? To me, the minority problem is simply a question of money. If we have the money, we have the talent.

I'm not a preacher; I'm a scientist. So, I use numbers to express my views. Lately, I have been working on a directory of Spanish-surnamed and native American professionals in the sciences. I believe, and you might correct me on this, that Ph.D.'s in the majority society now number about 600,000 in the sciences, a figure that gives us about 2500 Ph.D.'s per million U. S. citizens. The black community, I believe, claims about 600 doctorates in a population of 20 million, or 30 Ph.D. scientists per million population. As for the "browns," there are about 60 doctorates among 10 million or fewer persons, which yields about 6 per million.

In short, what we need is something of a Sputnik in education for minorities.

But, how could large numbers of new minority scientists be absorbed by society? Reverend Jackson suggested a goal last night of 5000 minority earth-science personnel in a five-year period. But under present circumstances, they could not be absorbed. It might, however, be possible to invoke Mrs. Chisholm's concept of sharing: There is no reason why any industry could not go on a four-day week; in this way, they could share 20 percent of the work load, which is to say that we could introduce 20 percent more scientists. If there are 38,000 earth scientists at present, this arrangement would allow us to introduce 7600 new scientists.

As another suggestion, there is no reason why chairs could not be endowed in the colleges and universities of the Southeast and the Southwest, or wherever there is a large number of minorities. In this way, we could assist the transition of minority students into the profession.

But where would these students come from, even if we did have--right now--the machinery to prepare 5000 scientists in five years. Where do you find the raw material? We hear references to seed money, which I think is a valid concept. But you may find that the germination rate, or yield, of students may reflect some poorly cultivated seeds. Keep in mind that students of the minority community do not relate the same way as the students of the majority community. It is essential for us, as minority scientists, to participate in the decision-making and granting processes of any such program. We want to participate. We want to accept the responsibility.

Cheryl Anderson

Undergraduate student at the Colorado School of Mines

In bringing this panel together, the three students among us discussed a number of points, and two main ones are these:

In our experience, and in the experience of our fellow classmates, it would be important to find and attract people who do not ordinarily go into such fields as mineral engineering. Second, we decided that to solve the problem of minority participation will require a coalition of industrial and educational institutions to provide the necessary financial--and perhaps even more important, the social or sociological--encouragement to get these students into the geosciences and engineering.

Earl Brooks, Jr.

Geoscience graduate student at the University of Washington

I would simply like to make the point that we are losing an awful lot of good young people. Somehow, we are leaving them out. As for myself, I was lucky enough to have been introduced to earth science when I was in college. I've managed to get summer jobs, but I have seen a lot of my friends who did not--even though we went to the same schools and they are just as qualified as I am.

What happened to these kids? What happens to all the kids who get lost along the line, who get crushed in the ghetto, who can't seem to get out, who don't know what rocks and trees are all about? I think business could profit from projecting itself into a world that is so much different from the one they know.

Finally, there are a lot of young people who could be trained as technical hands, as draftsmen, as mapmakers--not necessarily by college training. We are losing these people because we are not getting to them soon enough.

Toby Archuleta

Student at New Mexico Highlands University, Las Vegas, New Mexico

I would like to add to what Earl has said. In high school, the Chicanos, blacks, and Indians shy away from science courses--from the physics, and math, and chemistry they need in order to enter the geosciences in college. There is no reason why those Chicanos, for example, who do graduate from college in the sciences cannot then go back to high school students--the freshmen, even junior high school students--and stress that they take science-oriented courses. The younger kids can relate to these people. This way, you're reaching students at a time when they're most susceptible to being directed into a field like this.

They will see a Chicano in their class and ask him what he does for a living. He'll say he's a geologist, and from that point they will begin to ask how he got into his field. They can relate to him because he's a Chicano.

Question from the audience:

Don't you think that it is probably necessary to reach students even earlier?

Richard A. Scribner

Staff officer for Science and Society Programs of the American Association for the Advancement of Science

On the field trip yesterday, I had a chance to talk with several teachers, including a biology teacher. One of the points they commented on was that most of their students were lost to science before they ever got to junior high, and that it is in these earlier, formative years--probably grades kindergarten through sixth--where the motivation and the models are needed.

My association has a program called Science Process Approach for grades K through 6, and it is supposed to be fairly innovative. I am not here to promote it at all, but there have been some tests run recently, using this K through 6 "hands-on" approach to science with Chicano students in Texas and inner-city students in Philadelphia. It worked for the first three grades, and it didn't work for grades 4 through 6. It worked for kindergarten and grades 1 and 2, and, in some cases, grade 3. I don't know whether this is because the material itself was not prepared correctly for the students, or whether there was not sufficient motivation for the students as they got further along--or whether other educational aspects dampened the students' enthusiasm.

Question from the audience:

What do you mean by "it worked?"

Scribner: Okay, measured against how it works in other schools-- middle class white schools--students kept right up and were enthusiastic about it in these early grades and were achieving every bit as well as the well endowed white students. But, the minority students in the inner city, possibly because their educational environment was not as good by the time they got to the last few grades of their primary education, fell behind in spite of an extra effort that was being put in.

We are going to be running this test to find out whether students who are now caught up early, in grades 2 and 3, are going to do better as they get up into the higher grades. And we will try to learn what some of the factors are that are influencing this outcome.

Question from the audience:

How could the college students themselves set up a program where they would be "motivators" for minority students in the lower grades?

Miss Anderson: Well, before answering that, I'd like to comment on why there are so few women in engineering and the geological sciences. We found out why there have been impediments to black, or Chicano, or Indian entry, but there are women in white, suburban high schools and there are women taking chemistry, physics, biology, and math in high school, and doing well in them. Their parents are wealthy enough, and they do go to college. But, they

don't get into the geosciences. Why? I think the reason is that, as we prepare for college, high-school counselors, teachers, or administrators begin to say, "O.K., what are your interests? What are you good at?" And, if a woman is good in math, physics, or chemistry, they say, "Great, we need more math or physics or chemistry teachers in junior-high school."

Well, not all women want to be teachers in junior-high school, if they even want to be teachers at all.

Or else, they'll say, "Well, we need more nurses. You want to be a lab technician? That's good, too, because we need more technicians. You want to be a doctor? Well, I don't know about that. It takes a hell of a long time, and a lot of money, and you'll probably get married and have babies, and never be a doctor. So, I don't think you should do that."

And then, if you say, "Well, I want to go to the Colorado School of Mines. I've applied to Mines, and what do you think of that?"

"Mines! Well, obviously you don't know what you are getting into." They then tell you of the social stigma, the discrimination, and that it is going to be too hard for you, it is too difficult academically for a girl.

It is a flat out, explicit, "Don't. You won't make it." Counselors told me that there are only 2 women attending the Colorado School of Mines, and that I would be such a minority that I would never be able to make it. In fact, there were 70 women

going to the Colorado School of Mines last year. It is hard, but if a woman wants to make it, she can, as much as a black man or a black woman, white man or any other person.

In high school, you're very impressionable and you depend on other people almost totally for making your decisions, getting input from counselors, teachers, and administrators. They give you the best of their experience and knowledge, but it has been my experience that this is inadequate.

Statement from the audience:

It occurs to me that there are perhaps two ways of remedying this problem. One is for various organizations of minority groups to make better contact with guidance counselors. Perhaps also required is a fairly massive program on the part of the geosciences, as well as minority groups.

A second avenue, perhaps, is that of encouraging minority group personnel into the guidance-counseling field, as well as into the mineral or geological sciences and the mining industry.

Reese Watkins, student at the City College of New York, representing the National Black Science Student Organization:

We have been going to various high schools, junior-high schools--and next semester we'll be going into the elementary schools--making presentations that we feel have been very rewarding to the students.

So far, most of our members have been pre-medical students, but the organization is now branching out, and we hope to include

geoscience. Dean Charles Baskerville (Dean of General Studies at City College) and another professor have discussed with us the possibilities of setting up physics demonstrations for the students, as well.

As one example of things we have done that have proved beneficial to high-school and junior high school students, we have a science film called Cold Blue that shows black, Indian, and Chicano doctors working with our people in the community. The film deals with the problems that we are having in getting students into these fields of science and medicine. After the film is shown to classes--it lasts 28 minutes--we have discussions about some of the things we deal with, like lead poisoning and nutrition. We have spoken with guidance counselors in the various schools, and they say it is a good program, and that it has helped their students. Our program is not funded, although we would like it to be. We are all full-time students.

Statement from the audience:

Having been in the classroom myself as a teacher for 10 years, I am concerned that all these responsibilities are being put back on the high-school counselor. It is a mammoth, if not impossible, task for a counselor to learn about all the jobs available in every conceivable area of endeavor. I want to hear about what industry is doing, or would like to do, to help out in this area. Some of the companies in this field could assume part of the responsibility by opening up summer field work or laboratory jobs.

Bubba Jackson, Colorado Urban League, Denver

I come from the inner city and I can speak for that area. The ideal program for earth sciences' input for the urban schools is not simply more curriculum content, although that is commendable if it is made palatable. But there is quite a concern now in the black community among educators and others about getting cognitive skills--maximally transferable principles--into children's heads to make them independent thinkers. The commitment to all the plans you have for earth-science content, more effective motivation, and bigger and better filmstrips is fine--if a coalition can be made with some of the blacks who are trying to emphasize independent cognitive skills. I think that taking the content of geology and other earth sciences, which is exciting in its own right, and combining or ordering it along cognitive-skill lines, would be the ideal state.

Allen D. Trujillo

Chino Mines Division, the Kennecott Copper Corporation

As a representative of Kennecott Copper in southwestern New Mexico, I didn't want this audience to be left with the impression that industry has done nothing. Along with the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME), we have been talking to counselors and working with students. Some of our engineers are giving classes to various students in the area. You'd be surprised at the number of people who have lived all their lives in mining communities and still don't know how copper is produced. To offset this, we have been slowly working to get more information to the junior-high schools and the high schools.

I have worked a little in this program, and I'm just so disappointed with the educational aspects of it. Counselors are still projecting to junior-high students the idea that the best they can do is go to college and become a teacher. I'm not sure why this is so, but perhaps it is because the counselor is usually a teacher, and this is what he understands best.

Harold Fothergill, the Union Oil Company

I've been listening for a day and a half, and I get the impression so far that industry has done nothing. I wonder if you all really believe that. I think somebody ought to stand up and say what industry does. (See subsequent statement by Fothergill. -- Ed.)

We do have summer jobs for minorities, and Earl Brooks is one of those whom we have hired. All the majors do the same thing. We do an awful lot for students. Whether they are girls or minorities, we are interested in getting good people. I emphasize "good" because white folks have the same problem. Some are good and some are not. We've never discriminated--I cross my fingers on this--in the old context of minorities, because you seldom see a minority student.

I'll bet if you listed all the money from various company foundations for minority work that you would be amazed at the millions involved in this. Yet, almost everybody speaking here has his hand out to industry asking, "What are you going to do for us?" Also, I really question whether going to the secondary schools should be industry's job. Perhaps this is highly desirable, but we can't go all the way.

I think that if every university took the instructor who teaches introductory physical or historical geology, and sent that man out to the high school or the junior-high schools, that this is where the selling job could be done.

110.

General Discussion

Friday morning, June 9

Pete Mirelez

Director, Division of Migrant Labor and Programs for Spanish Speaking People, Office of Economic Opportunity

I want to start by complimenting all of you who have taken the time to set up this conference and to participate in it. You might be interested to know that at one time I thought of trying to get into the geosciences. For one thing, my father and my uncles had worked in the mines here in Colorado, and I worked on an oil rig to make enough money to get me through school.

But I did not think that I was really capable of entering such a profession. Now, of course, I feel that I believed that more because of my conditioning by the system than anything else. That conditioning told me that I would be more likely to make it as a truck driver than as a college student.

Conditioning that it could not be done was not all, either. My high school counselor said my tests showed that I would never make it through college--but that I sure as hell could drive my way through New York. Those were his actual words. And I think they speak eloquently to one of the problems that we, as minorities, and specifically that we, as Chicanos, would like this conference to consider: Our educational institutions, especially at the elementary and secondary levels, have not geared themselves to assisting minorities in developing the background they need--both psychological and academic--to enter the sciences and to persevere for the time it takes to achieve and succeed.

And, of course, most people in the earth sciences have either a master's degree or a doctorate. Most of us Chicanos find this a rather remote goal, for while we would certainly like to stay in school for the number of years that it takes to get a Ph.D. or a master's degree, we are faced with a more immediate problem--that of survival.

This leads me to two points. First, in regard to our educational system, I think we are going to have to attack the whole question of involving minorities in all areas that require a number of years of training, whether the field is medicine, law, or the earth sciences. Second, we are going to have to work more closely with parents, more closely with minority organizations active in our neighborhoods, and more closely with professional societies. We need a unified approach and we need catalysts. Universities could serve as catalysts, and, perhaps more important, so could industry.

Why are there so few Chicanos in law, medicine, or the geosciences? The schools are one answer. But these fields have also been foreign to us. We have not been able to identify with people in them and say to ourselves, "If he did it, so can I." I think this is one reason why so many of our young people are going into education and social work. They have peers there. *Compadres y hermanos* (close acquaintances).

What we really have to do is to develop a practice, or a mechanism, whereby some of you in industry and the universities can give of your time, your expertise and whatever you can afford,

to visit high-school clubs, to visit city groups, to talk to parents, and generally to spend some time in our communities. This is what can make the difference.

Now, a lot of you might say this is all very idealistic but that you cannot spare the time. Well, ladies and gentlemen, we have got to make the time. If engineers and geologists can work with--or get elected to--state legislatures, city councils, and boards of education, and thereby influence policies at all levels, they can hold formal workshops in minority high schools. They can work with counselors, they can talk to civic groups made up of minorities, and that may be the key to the change we need.

Problems in helping minorities can be subtle. I was flabbergasted recently when I heard that a school-laboratory manual for use in the United States by Spanish-speaking students had been translated into Spanish by a Colombiano. Now it's great that a Colombiano did it, but the problem is that the Spanish used in our barrios is not the same Spanish spoken by a Colombiano. And this could create problems in the way the manual was used. We have to be conscious of this sort of thing, for it can make the difference between turning young men and women on to the sciences or turning them off.

By the same token, those who provide assistance for minorities through summer jobs must take a young man or woman's culture into consideration. I just cannot overemphasize the subtle discrimination that exists in our educational institutions and elsewhere against

minorities. You almost have to be one to appreciate it. One simple rule: Don't set all kinds of cultural limitations. Don't ~~make~~ him cut his hair or shave his mustache. Capitalize on a person's culture, don't deny it.

One other thing that I would emphasize: While we think about recruiting minorities, we should think not only of bringing in students from the emerging middle and upper classes, but also of bringing in Chicanos from the barrios. We should be willing to look for the fellow with latent potential, even though he may not be in the upper 10 percent of his class.

Bubba Jackson

Colorado Urban League

The first thing we have to address ourselves to is communications. You can have all the scholarships in the world for minorities, but if you cannot communicate the earth sciences to them you cannot attract them, and all your effort is for naught.

One thing neglected in yesterday's discussion was the matter of basic survival. One individual talked about a program to teach elementary students something about earth sciences. He said that from the first grade through the third the kids did all right, but after that the kids blew it. Now it happens that beginning about the fourth to sixth grades in the ghettos, barrios, and reservations of this country, the students' basic concern becomes survival. You have to learn to survive to get to high school or to get your diploma. Many of us do not make it to high school because we are too busy dealing in survival. This is a fact that you have to consider. Ignore it, and you will not have meaningful minority participation in the earth sciences.

With this in mind, I want to propose a seven-year working plan for government and industry. The immediate goal of this conference should be the recruitment of more blacks, Chicanos, and Indians into all phases of earth-science operations where special education or vocational training is not required. I know that some of the jobs in this field do not require a college education, and these can serve as entry points to the earth sciences. Where vocational

training is required, it can be administered by the industry but supported by the government--although it might be a much more meaningful experience for the industry, or a particular company, to do it all.

Vocational training is very, very important. We have young men coming out of today's prisons who need this help. We have young men coming back from Vietnam who need vocational training. They need it in order to participate in the mainstream of American society. To deny it to them is to say that they do not have the right to become functioning components of society. And I do not think that anyone here can say that we do not have this right.

Next, those persons who take part in a vocational-training program and who want to go on to become geoscientists should have the opportunity--right within the company--to upgrade themselves. There should be scholarships available to individuals to the college of their choice, to major in some phase of earth science or engineering. The company should foot the bill because this is meaningful minority participation.

Beyond this, the companies can begin to draw up a realistic recruitment program for minority students who are already in college. With the help of the government and the geological societies, industry can begin recruiting sophomores, juniors, and seniors. And you cannot stop here. These students should be offered summer employment and scholarships or partial grants. When minority students

get on these white campuses they have trouble getting financial aid. And this is one reason so many of us drop out before graduation.

Another thing industry could do would be to donate scientific equipment, or the money to buy equipment, for teaching earth science in minority high schools. Usually minority schools cannot afford this kind of equipment because the neighborhoods they serve cannot pay the high taxes necessary to buy it.

Now I agree that industry by itself does not have the ability to go into high schools and colleges and reach minority students. But there are organizations, like the Urban League, who do have the ability. Industry has only to call on them.

To do all this, you need effective communications. This is what American society lives by. You can use the mass media--films, radio announcements, whatever--developed by blacks, Chicanos, and Indians especially to interest these groups. Industry, of course, should pay the bill, for they will gain new manpower.

At the same time, though, industry cannot pay the whole bill. But it could foot 90 percent of it with the government paying the rest and providing additional jobs. Moreover, if a black college does not have an effective geological program, the geological societies can help come up with the necessary program and the government can provide the instructors. There is no excuse for a black college not having the kind of curriculum that you consider to be qualified. If the program is not qualified, it is because you have not contributed to it.

In the past, you have ignored a lot of things. You ignored crime in the ghettos and the barrios, and now you have a crime problem in your neighborhoods. You ignored drugs in the barrios and reservations and ghettos, and now your own kids are coming home as junkies. You can no longer ignore the fruits of racism; Americans can no longer afford this luxury. It is time to produce an effective plan of action. And you have got to pay the bill because we cannot afford it.

Dennis Banks

American Indian Movement

In 1976, the United States government will celebrate its 200th birthday, and it isn't even your country. A bicentennial commission has been established to prepare for this celebration, but it has no Indian members. That tells a lot about how people, yourselves included, think about this country.

Now I find myself among a group of people who seem to be paralleling the efforts and actions that have led to massive thefts of land from Indian people. Here we have a group of scientists, mostly non-Indians, preparing a future for American minorities. My question is whether the next 200 years will be like the past 200 years for American Indians.

You must know that there are people masquerading as Indians, pretending to speak for us. They are one-sixteenth Cherokee, or they had a Cherokee grandmother, or some such thing. And they are the ones who are selling us out. Because of them we have asked for a resolution here that earth scientists refrain from activities that exploit Indians and violate our treaty rights. While this may not mean much to non-Indians, it means a hell of a lot to us. We ask those of you here today, gathered in the name of science, to take a stand against the corporate, political, government, and personal interests that would further rob Indian people of Indian water, Indian land, and Indian rights.

It is hard for us to get at the Honeywell Corporation. It is hard to stop Kennecott, and it is hard to stop the Peabody Coal Company from taking our mineral wealth. But if you are as concerned about Indian people as you have been about making money, we will be happy to sit down with you and break bread at the table again.

You have talked about inadequate counseling and about America's inadequate educational system. But you must admit things are even worse for Indians, for everything in the curriculum is anti-Indian. Yet, if you make the necessary changes, we will buy our own buses and come to your schools. You will have no problems in recruiting Indians for these schools that provide technical education.

The Indian is tired of living an average of only 40 years. He wants to enjoy the same kinds of benefits that people all across this world enjoy. But there will no longer be cigar-shop Indians; we have earned our place in society, and we are sick and tired of the non-Indian society that controls us.

Randolph W. Bromery

I don't want to get personal again, but we always know best what we know personally. So for those of you who wonder whether one or two or three people can really make fundamental changes, I would like to relate an experience of mine that suggests that you really can make changes.

When I joined the geology department of the University of Massachusetts in 1967, I was the school's sixth black faculty member. At that time we also had 36 black-American students on the campus, one black woman in the kitchen, and no black people among non-academic professionals at the University.

One day, over a hamburger, the other black-faculty members and I talked about how we could change this situation--about how we could increase the number of minority students, and how we could change the campus environment to be more hospitable to the incoming black student, a point I emphasized in my earlier speech. More than simply bringing in minority students, we wanted more black faculty, more black persons in the kitchens, more blacks in middle-management positions.

Now, we could have asked the institution to do this for us, but we decided to do it ourselves. This proved not an easy task, because we needed some kind of a base from which to operate. And since the population of Massachusetts is only four-percent black, we did not constitute much of a political or economic threat. As a result, we had little success at first in persuading people to address themselves to "our" problem.

So we incorporated ourselves as a non-profit, tax-exempt organization. We went to a foundation and said, "We are a corporation, and we want some money to bring minority students into the University of Massachusetts." To make a long story short, the foundation gave us nearly a million dollars spread over a four-year period.

The next step was to design a program to accomplish our goals. Our goal was not to integrate the freshman class, it was to graduate educated black students with skills. The first thing we learned was that the university entrance requirements--in particular the Scholastic Aptitude Tests--were confined to a narrow window between 570 and 610 for math and verbal scores. We knew that the school received 28,000 applications for 3,500 openings for freshmen each year and further, we also found that the average SAT scores for blacks, Puerto Ricans, and American Indians was around 430. Therefore, the going was bound to be rough.

We designed a program for minority students that was in keeping with Bubba Jackson's suggestion earlier. It was a "survival" program, aimed in part at helping students withstand the cultural shock of coming into a large predominantly white university. As it was, we were losing 35 percent of our white freshmen simply because they were unable to make the transition from a home environment to one with nearly 10,000 students in residence halls and 10,000 commuter students.

One problem that we faced was a regulation at the university that if a student did not have a certain grade-point average at the end of his first semester in residence, he would lose his four-year scholarship. We successfully petitioned the school's Admissions and Records Committee to change this rule--for all students, not just minorities--to one in which a student's cumulative average at the end of the first full year of residence would be the determinant. As a result, the dropout rate among white freshmen went from 37 percent to 22 percent, which demonstrated that programs for minority students can also have significant spin-off benefits for the entire student population.

What were the results of our program? We are still incorporated and active, and through our corporation the university has obtained an extra 3.4 million dollars, from private, state, and federal sources, which makes our existence of at least some economic importance to the university. In four years, the number of minority students has gone from 36 to nearly 1000. We have nearly 50 black and other minority faculty and non-academic professionals. We don't have any more black persons in the kitchens, but we have a few in other areas of the physical plant. We had no black secretaries and now we have over 30.

Last June we graduated 50 black students--more black students in this one class than in a total of all of the graduating classes in the university's 103-year history. We have expanded the program

to the point where 650 minority students will enter this fall, of whom 125 are Spanish-speaking students. All of our admissions information and a number of our counselors and regular university courses are bilingual.

Thus, we are convinced that we have demonstrated that a few people who work together and seriously want to make changes, can succeed.

ACTION-PLANNING SESSIONS:

CONCLUSIONS AND RECOMMENDATIONS

- A. Motivation and Education of Minorities
- B. Employment Opportunities for Minorities
- C. Minority Programs for Professional Societies
- D. Professional Responsibilities and Standards
- E. Implementation of Minority Participation Programs

Friday, June 9

(On Thursday afternoon, conference participants formed five separate and concurrent seminars in which they worked to synthesize the previous two days' discussions. During these sessions, conferees attempted to crystallize in brief statements what they felt were the major findings of the conference and the future courses of action most appropriate to pursue. The following reports of the action-planning sessions are based on oral summaries presented to the conference on Friday morning, on stenographer's notes, and on the written reports of seminar leaders. ---Ed.)

A. Motivation and Education of Minorities

Conclusions:

This seminar singled out two separate, distinct, yet equally urgent goals. The first goal, regarded as a short-range objective, was the identification and motivation of those adults who are already past high school age, and who would be capable of achieving professional status in geoscience or engineering fields if given on-the-job training or additional education.

In this category, two pools of talent could be tapped: men and women now employed by government and industry who may already be performing some professional tasks in their daily work, and returning veterans. As for the latter group, Stanley E. Edelstein, the Deputy Director of Education and Rehabilitation Service for the Veterans' Administration, told this seminar that the VA is interested in directing veterans toward earth science and engineering careers. He noted that 5 million veterans currently are eligible for education assistance from the VA, although only 1.3 million are presently taking advantage of these benefits.

The second major goal--a long-term objective--should be to stimulate an interest in the earth-science and engineering fields among young people from the early elementary grades through the college years.

Recommendations:

1. Lowering language barriers

Long before they begin attending school, children whose primary language is Spanish, or who live in the inner city, often learn to communicate in what is best described as "non-standard" English. Teachers should recognize that these versions of English are important elements of the children's culture and hence of their self images. Efforts to teach standard English should carefully avoid conveying negative or derogatory attitudes toward non-standard English; teachers, in fact, should learn the language their children bring to school. Perhaps most important, tests of intelligence or academic performance must use forms of expressions familiar to a child until he or she becomes adept in standard English.

2. Counselors

Numerous participants in the conference indicated that guidance counselors in junior-high schools and high schools have systematically directed minority students away from careers in mathematics, engineering, and the sciences. It is hoped that this practice is on its way to becoming a thing of the past. Counselors should actively encourage qualified minority students to prepare for careers in these fields.

3. Elementary earth science

It is recommended that earth science be incorporated in elementary school curricula. Minority college students preparing

for elementary school teaching should be encouraged to include science in general--and earth science in particular--among their courses, so that they may help convey to their students a curiosity toward the natural sciences.

#### 4. Tutorial scholarships

A tutorial scholarship program of minority college students could fulfill several needs: Financial support for the college student; tutorial assistance by the student for younger minority people faltering in school; a need felt by many minority students to work in their communities.

#### 5. Summer work-education programs

Programs should be developed and financed to place minority high-school students in a college environment during the summer, where they could receive intensive tutoring in science and math. Two ingredients are essential to the success of such a program: cooperation of the students' families and payment of a small stipend to make up for salaries the students might have earned in summer jobs. The physics department of the University of Colorado at Boulder has recently experimented with such a program, in cooperation with Denver high schools.

#### 6. Professional activities

Professional geoscientists and engineers should be encouraged to take "company time," as well as their own, to work with minority students in educational and motivational programs. One approach may be to hire marginally motivated or prepared high school students as part-time assistants to professionals. In so doing, however, the professional should place first priority on awakening the interest of the student, rather than on simply pursuing his own work.

In addition, professional societies and industry should assist in developing traveling exhibits on earth science for high schools. They should also plan to cooperate with such organizations as the National Black Science Students' Organization. (Charles A. Baskerville, Dean of General Studies at the City College of the City University of New York can provide information about this group.)

7. Community colleges

Community colleges should be urged to facilitate admission of minority students by means of open admissions, free tuition, and free textbooks. Four-year institutions should be urged to offer scholarships and other forms of aid to the best minority graduates of 2-year schools.

B. Employment Opportunities for Minorities

Conclusions:

Some corporate representatives felt that optimism about future job markets should be tempered with caution, in view of employment projections discussed earlier by J. R. Jackson. Nevertheless, participants in this seminar generally agreed that employment opportunities for minorities would be more than adequate for many years to come.

Several minority students from Denver high schools took part in this session. They emphasized that they were less interested in a long-range commitment to attracting and helping minority students than they were in overcoming the immediate, practical difficulties of learning precisely what the earth sciences are, what job opportunities these fields offer, and how one goes about preparing for and finding jobs.

Representatives of government and industry, for their part, said they were actively seeking minority college graduates for earth-science jobs. Thus, one principal problem appears to be that of communication between potential employers and pre-college students.

Recommendations:

1. Linking students to jobs

An effective network of communications is urgently needed between government and industrial employers, on the one hand, and college and pre-college students on the other. Job opportunities in

the earth sciences and mineral engineering, and the means of securing those jobs, must be clearly and widely communicated to high-school students.

## 2. Financial aid

Once motivated toward geoscience and engineering careers, minority students should be able to rely upon substantial sources of financial support as they progress toward undergraduate and graduate degrees. Information about such assistance should be readily available to high-school students before their senior year, so as to facilitate planning for admission to college.

## 3. Summer jobs

Larger and more meaningful summer-job programs in government and industry should be opened to minority students. These programs would serve to introduce students to the attractions and the methods of the earth scientist and engineer. Students thus employed may serve as new "ambassadors" of the profession to their schools.

C. Minority Programs for Professional Societies

Conclusions:

Conference speakers have repeatedly emphasized that a major impediment to success in recruiting minority students for the earth sciences was a lack of "communications." Thus, while many students need financial assistance, scholarships go begging; thus, industrial interviewers visit campuses in search of students to fill summer and permanent jobs, but some qualified students learn of these visits only after the recruiters have left; and students who could benefit from summer field and laboratory jobs find themselves in menial and meaningless summer jobs simply for want of reliable and comprehensive information about the opportunities available in their future profession.

The 20 participants in this action-planning seminar, representing a variety of scientific and engineering organizations, agreed that the professional geoscience and engineering societies could do much to improve communications with students through new and existing educational activities.

The national offices of these 20 or more societies, working through their numerous local chapters or divisions, could potentially reach into nearly every community in the nation to provide students with information about earth-science careers. Through their local units, the professional societies are uniquely and superbly equipped to stimulate the interest of junior-high school, high-school, and college students by such means as sponsoring lectures, field trips,

and exhibits that convey the excitement, the challenge, and the importance of our varied profession. Two programs worthy of special note in this regard are the Environmental Studies Project and the Earth Sciences Teacher Preparation Project, both sponsored by the American Geological Institute and the National Science Foundation.

At the same time, however, sporadic and isolated local efforts cannot solve our problems of minority participation. A central-national organization is needed to coordinate these efforts, so that active groups may learn from each other's experience. Moreover, the expense of a national program of significant scope--involving such forms of assistance as scholarships and aid to the geoscience departments of small colleges serving predominantly minority populations--demands a national organization with a full-time staff. The logical place for such an organization is within the American Geological Institute.

By the same token, the American Association for the Advancement of Science would be the proper organization to serve as an "information exchange" to link minority programs of the geoscience societies to the scientific community at large.

Recommendations:

1. Contributions to the AGI

This panel recommends that contributions be solicited from all member societies of the AGI, from all industrial and educational

contributors to AGI, from minority organizations and all other employers of geoscientists and engineers to support the AGI's proposed minority program for an initial period of two years.

2. Educating members of societies

Scientific societies should inform their members and affiliated organizations of the significance, the findings, and the goals of this conference through meetings, publications, student chapters, and education committees. Members should be encouraged to work in their minority communities to ensure the success of this program.

3. Elementary education

We recommend that conference participants seek broader support for such programs as the Environmental Studies Project and the Earth Sciences Teacher Preparation Project. These programs provide elementary school students with a valuable, early introduction to science and these programs are particularly useful in minority communities.

D. Professional Responsibilities and Standards

Conclusions:

Discussants agreed that, in the long term, a double standard of professional acceptance for the purpose of easing the entry of minorities into the earth sciences would be highly disadvantageous, both to the profession and to minorities. The profession must take pains not to generate a "second class" of ill-trained geoscientists and engineers.

At the same time, employers and institutions of higher education must seek innovative, non-traditional ways of furnishing minorities with the education and training they need. For those already employed, continuing education programs and financial support for persons enrolled in them, must be provided. For students, special stipends, variable-length programs of study, remedial-course work, tutoring, and work-study programs deserve emphasis. Colleges and universities should also consider increasing the number of "non-qualifying" minority high-school graduates they admit each year.

It was also felt that employers should strive for flexibility in their standards when considering promotions, in order to allow semi-professional employees (such as technicians) to advance on the basis of demonstrated potential--and not solely on the basis of degrees held.

Recommendations:

1. Advancement to leadership jobs

The geoscience profession should not only seek to open new job opportunities to minorities, but should also help minorities

to reach responsible leadership positions in government and industry, where crucial decisions affecting minority employment are made. In addition, employers should be prepared to deal with the difficulties that minority employees may experience in adapting to a new and potentially hostile working environment.

## 2. Examination of standards

Employers, as well as colleges and universities, should define the standards they use as criteria for hiring or admitting men and women, and eliminate or modify those standards which are likely to disqualify minority group members disproportionately.

## 3. Professional responsibilities

At the suggestion of Dennis Banks of the American Indian Movement, the group resolved that earth scientists should consider adopting a code of professional ethics to ensure that their talents shall be used in such a way as to safeguard human life and to conserve natural resources; and, further, to ensure that geoscientists not use their skills in a manner which may tend to violate the treaty rights of American Indians or the civil rights of any other minority group.

E. Implementation of Minority Participation Programs

Conclusions:

Given a reasonable rate of entry into the earth-science profession, we expect that job opportunities for minorities will be plentiful for the foreseeable future. Making minority high school students aware of these opportunities, however, would seem to be a major problem, and one that derives in large part from inadequate career counseling. It is possible that corporations could help overcome this deficiency by maintaining closer contacts with teachers and counselors in their respective communities.

Recommendations:

1. Industry ties to counselors

Teachers and counselors in high schools should be provided with the names of several geoscientists and engineers in their geographic area who would be available to talk to individual students, provide them with information on geoscience careers, and possibly contribute to high school science classes.

REPORTS OF INDEPENDENT CAUCUSES

Women's Caucus Report

Chicano Caucus Report

Industry Representatives' Statement

Friday, June 9

Carla Sydney Stone, student in mining geophysics, Henry Krumb  
School of Mines, Columbia University

The U. S. Government, and the minerals, mining and petroleum industries have discriminated against women by not hiring, promoting, or providing job opportunities commensurate with education and responsibility.

The highest priority must be given to establishing a registry to identify those women trained in the geosciences. This registry would serve as a clearinghouse to ensure that employers conduct a national search for qualified women.

We want all job categories open to all applicants, regardless of traditions and superstitions. Discriminatory state and Federal mineral employment laws must be struck from the books. Women must be encouraged to pursue careers in the geosciences. Scholarships must be awarded to young women wishing to participate in the industry. Once a woman has made the decision to enter the industry, she must be given the opportunity of on-the-job training in the mills, underground, and in the field.

Industry and government must provide insurance policies, including maternity benefits. Women must be free to take maternity leaves with no loss of seniority. Day-care centers should be provided for the children of these working geoscientists.

We want an education program to emphasize that women belong in the earth sciences, that they are now successful and that they can combine marriage, family, and a successful career.

Miguel Rios, physicist, California State Polytechnic University,  
Pomona

The Chicano caucus met at this conference for the purpose of formulating specific objectives to be adopted as a part of a comprehensive plan to increase the number of Chicanos in the geosciences. Although formulation of such goals was to be a primary responsibility of the conference, and although participating companies, agencies, and institutions have demonstrated concern about this problem, many of the Chicanos here doubt that these participants are truly committed. We feel, for example, that if the Department of the Interior had a real interest in solving the problems we face, the Secretary of the Interior, Rogers C. B. Morton, would be present here, today. If the Federal Government were truly determined to help solve our problems, the Federal agencies responsible for the progress of science in this country would be represented here by their directors or by people in their top echelons. The Director of the National Science Foundation, for example, is not present here today. Nor has the NSF shown any real interest in funding undergraduate programs in the sciences for minorities.

We know that of the approximately 30,000 geoscientists in this country, less than one percent is Chicano. The situation is just as bad in the other physical sciences. There are approximately 20,000 Ph.D. physicists in this country. Only about 10 of these are Chicanos, whereas 5 to 7 percent of the total population in this country is Chicano. The situation is essentially the same in chemistry and mathematics.

Similarly, we know that more than 50 percent of earth scientists are employed by private industry, primarily in the petroleum and mining industries. Yet, there are no executives present here today from the top echelons of management in these industries. We fear that most of the participants from private enterprise will simply write a report when they return to their respective companies.

With respect to institutions of higher education, we feel that they have yet to open their doors to the Spanish-speaking community. In particular, the Colorado School of Mines has obviously ostracized the Chicano from the educational process on that campus. Of the 2000 students on that campus, there are only seven who are Spanish surnamed. Of these seven, most are probably Latin Americans. The Colorado School of Mines employs no Chicano faculty members.

The Spanish-speaking community has received many promises in the past and very few have been kept. Because of these broken promises and because of our determination to obtain adequate representation in all areas of intellectual endeavor, the Chicano caucus met and formulated requests which we expect industry, government, and the Colorado School of Mines to meet.

Department of the Interior: The Department has one of the worst records for providing opportunity for the Spanish-surnamed community. The following requests should, therefore, be implemented:

The Secretary of the Interior should establish a yearly budget of \$500,000 to open opportunities for the Spanish-surnamed.

A Spanish-surnamed person should be hired and given the authority to staff and implement the following resolutions: Sixteen hundred

additional Spanish-surnamed people should be hired by 1975 to make our representation in the Department of the Interior commensurate with our population; goals and timetables for each agency within the Department should be established; the Spanish-surnamed should be hired at all levels within the Department, including GS-18; funds should be channeled to the Southwest to prepare Spanish-surnamed youngsters for participation in all aspects of the Department's activities; work-study, cooperative education, and educational programs for the Spanish-surnamed should be initiated, and intensified where they exist.

The Department should establish training programs to upgrade the skills of the Spanish-surnamed presently employed by, or who will subsequently join, the Department; the Department should initiate action to employ the top 10 percent of the Chicano enrollment in every school; each agency should set up a task force chaired by agency heads to develop specific action plans for the Spanish-surnamed. Quarterly reports on progress should be submitted by the Department of the Interior to such Spanish-speaking organizations as IMAGE (Incorporated Mexican American Government Employees), LULAC (League of United Latin American Citizens), and G. I. Forum.

Petroleum and Mining Industries: These industries must make written commitments to initiate affirmative action for hiring the Spanish-surnamed; definite goals and timetables should be devised within the next 90 days and submitted to the conference sponsors and the Colorado School of Mines' Board of Trustees to be used as guidelines for formulating plans and programs to involve the minority communities.

Industry should initiate scholarship programs specifically for Chicanos majoring in the earth sciences. Information on the scholarships should be disseminated to schools enrolling large numbers of Chicanos and to all Chicano organizations. Industry should initiate summer programs not only to expose high-school students to the geosciences, but college students as well.

Industry should initiate cooperative-education programs with colleges and training programs for Chicanos already in industry to advance the Spanish-speaking to higher positions.

The Colorado School of Mines: The School should initiate a program to bring Chicanos into the field of earth sciences. This program should actively recruit both students and faculty. The program should be supplemented by tutoring, counseling, financial aid, adequate housing, and by other student services that will facilitate success for the Chicano student.

The Chicano caucus expects the Colorado School of Mines to devise a master plan outlining the specific activities, schedules, and financial resources that it will commit to the implementation of this plan, beginning in the fall of 1972. Also, courses should be instituted in the curriculum to deal with the contributions of minority people to the earth sciences, to the laws concerning the earth sciences, irrigation, and so on.

The Chicano caucus expects that the Colorado School of Mines will develop a summer program, in cooperation with the local school

districts, to identify Chicanos with potential for the earth sciences. The Chicano caucus feels that the minorities should be represented in the planning of these programs.

In conclusion, the Chicano community requires supportive service and financial assistance to move ahead in its attempts to reach population parity in the sciences.

It behooves the Federal agencies, the educational institutions, and industry to realize that we, indeed, have been overlooked. We sincerely hope that you will respond and will provide the assistance we need, so that we may take our rightful place in this society.

Harold L. Fothergill, Personnel Coordinator, the Union Oil Company

I was elected to present a statement here on the last day about what we representatives from industry are thinking. At the outset, I should note that we have not had too much input to this particular conference, although we would like to have done more.

One thing you can be sure of: we were here today, yesterday, and the day before because we are interested in these problems. We have been working on them and we are anxious to do more. We are very interested in all the suggestions and recommendations that may come out of this conference, and we plan to act on them to the best of our ability.

I hope you know that industry is committed to seeking out all qualifiable, talented, minority students in geoscience programs for both permanent jobs and summer jobs. We believe that we (industry) have succeeded in hiring every minority graduate in earth science this past year. In addition, this summer we think that we (industry) have probably hired all juniors or above among minority earth-science majors. There is no coordination among companies to ensure that this has been accomplished, but this is the feeling that we have.

Apparently, one of the big problems that we have is one of communication. This has been most obvious to me during these three days. We are all keenly aware of these problems but there has been no obvious attempt to coordinate what has been done by industry, by the schools, or by the minority groups.

To give you just a small example of some of the constructive programs that our particular companies represented here have been doing, I would like to read a list here that we put together for you. We have many scholarships for minority students in earth science. I would venture to say that there is at least one scholarship for every declared earth-science major who is a minority student in the United States.

This, I think, is a sizable accomplishment. We also can arrange for tuition refunds. All of these now apply to minority students.

In many of the companies, if an employee makes a contribution to a minority cause, the corporation makes an identical grant. We make grants to the earth-science departments and to many schools around the country.

We have grants for major construction programs on the campuses, scientific-equipment grants, and cooperative work-study programs. We have summer jobs by the hundred. We have teacher workshops. We have job fairs, where our people attempt to show the public what earth-science people do. We have occupational-awareness programs for junior high schools.

Again, let me reiterate that we are all here because we want to be, that we are eager to continue, to improve, and to add to the programs that we already have. We feel that at present what we have been doing has been somewhat fractionated, definitely uncoordinated, and, in the main, unadvertised. Now, perhaps, with the recommendation that the American Geological Institute establish a two-year coordinating committee, we will be able to coordinate all of these actions and all of us will be able to see the size of it. And, we all hope that we will be able to do more in the future.

Appendices

The AGI Minority Program

Conference Participants

Minorities in the Geosciences: The Role of the American Geological Institute

The American Geological Institute has been concerned about the number of minority group people in the geosciences since 1967, when its Earth Science Curriculum Project recognized the need to reach the disadvantaged youth in the inner-city area. Based on this concern, the Institute has sponsored Environmental Studies for Urban Youth, a project funded by the National Science Foundation.

In the fall of 1970, a group of geoscientists in the San Francisco Bay Area circulated petitions calling upon the Geological Society of America and the Society of Exploration Geophysicists to initiate vigorous programs to increase minority participation in the geosciences. These petitions, supported by colleagues across the country, were endorsed by those societies' Councils in November 1970, and committees were assigned to investigate the problems and formulate a program to cope with it. Supporting positions have since been adopted by the Seismological Society of America, National Association of Geology Teachers, Geochemical Society, Association of Engineering Geologists, Society of Economic Geologists, and Society of Economic Paleontologists and Mineralogists.

In September 1971, the Acting Director of the U. S. Geological Survey wrote to Survey employees calling on each of them to join in an energetic program to improve the Survey's record in professional employment for minorities. This program is now being vigorously prosecuted in all Survey offices.

In the spring of 1971, the AGI Education Committee discussed ways of increasing the number of minority geoscientists. Its members believe that students in predominantly minority group colleges are simply never exposed to the earth sciences. The committee proposed a program in which interested professors from related fields might undertake studies in earth science and introduce at least one course in the field upon return to their home campus. Institutions that have expressed interest in contributing to this program include the state universities of Oklahoma, Texas, Massachusetts, and Minnesota, St. Lawrence University, and Amherst College and Virginia State College.

#### The Program

The Geological Society of America and the American Geological Institute have agreed to establish a Minority Program Advisory Committee, under the aegis of AGI, to promote and coordinate a profession-wide effort to encourage increased participation in the geosciences by members of minority groups. This Committee is initially composed of one representative from each AGI member society that provides support to this effort. An Office of Minority Participation in the Geological Sciences, headed by a coordinator, has been established at AGI. This office is responsible, under the guidance of the Advisory Committee, for development and administration of program, fund solicitation for program support, and coordination with similar programs of other

organizations. The office will prepare proposals for support of specific programs and will accept and disburse funds received from AGI member societies, and federal, state, and private sources. Depending upon the amount of financial support, it may do such things as these:

- a. Assist in career guidance for minority community and college groups.
- b. Identify job opportunities in earth science for minority youth.
- c. Consult with schools that have a large minority population and are planning earth-science programs.
- d. Enlarge the expertise in earth sciences of faculty members in predominantly black colleges.
- e. Provide scholarships for needy students in predominantly black colleges and colleges with large enrollments of Spanish-surnamed or American Indian youths (or both).
- f. Provide financial aid to colleges with large minority populations so that minority students at these schools can study earth science at a 'paired' white college.
- g. Offer undergraduate and graduate scholarships for minority members in predominantly white universities.
- h. Support the pre-college participation of minority youth at summer geology field camps.

- i. Seek endowment for chairs of geology and geophysics at minority colleges.
- j. Provide career counseling in the geosciences for minority veterans.

### The Goal

It would not be realistic, or even desirable, to attempt to achieve parity of racial makeup in our profession by a crash-recruitment program. A more realistic approach is to consider how many minority persons would have to enter the profession each year to maintain a parity pool of minority group geoscientists if that pool already existed. For example, assuming an average professional career-span of 30 years and a pool of 3,300 black geoscientists, at least 110 blacks would have to enter the profession every year. That means parity of the profession with the total population will not be achieved until 30 or 40 years after that rate of flow is achieved, or sometime well into the 21st century.

### Recent Progress

In the weeks since the conference, the proposed AGI minority program has received encouraging support from several sources. As seed money to implement the program, the Charles E. Merrill Trust has made available \$25,000 which is being used to support organizational activities and studies now underway at the Institute. In addition, the Minority Participation Program has received contributions totaling \$1,500 from the Society of Economic Geologists and the Society of Economic Paleontologists and Mineralogists. Further contributions are now being made by members of the Geological Society of America and the National Association of Geology Teachers. Other

sources of funds to supplement the Merrill grant and society contributions are being sought; in this respect, discussions with the National Science Foundation, the National Institute of Education, and the Ford, Rockefeller, and Danforth Foundations have all been encouraging.

Dr. Mack Gipson, Jr., Professor of Geology at Virginia State College, Petersburg, has been employed by AGI on a part-time basis as Program Director. Dr. Gipson has agreed to serve in this capacity until a full-time director can be identified.

Meanwhile, the Institute's Education Office is exploring ways in which the program might best serve minorities. The Alabama Center for Higher Education (a consortium of eight predominantly black institutions of higher education) has expressed great interest in participating in some phase of the minority program. And the U. S. Geological Survey has been actively supporting the rejuvenation and reorganization of the geology degree program at Howard University. The Survey has given Dr. Thomas Gibson and Fred Wilson time to serve on the Howard faculty. The AGI Education Office has been working closely with students and staff at Howard, and the program appears to be off to a good start.

On October 19, the AGI sponsored a panel on "Geology as a Career for Blacks" at the annual convention of the National Black Science Students Organization in New York City. The panel consisted of Dr. Gipson, Charles A. Baskerville, Dean of General Studies at City College of New York; Fred Wilson of the U.S.G.S., now teaching

mineralogy at Howard; and Michael Lacy, a senior geology student at Virginia State. The panel--the first of its kind for an NBSSO convention--was well attended and seemed to elicit great interest from the students in the Institute's minority program.

Finally, Mrs. Bonnie Henderson, the AGI manpower specialist, has compiled new student enrollment figures that clearly indicate a great and continuing imbalance in the proportion of minority students in geoscience programs.

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DISTRIBUTION OF MINORITY STUDENTS IN GEOSCIENCE, 1972

		Black Americans	Spanish- Surnamed Americans	Oriental Americans	American Indians	Total
Undergraduate Majors	#	102	159	103	13	377
	% of total	(27.1)	(42.2)	(27.3)	(3.4)	(100.0)
In Master's Program	#	50	41	28	4	123
	% of total	(40.7)	(33.3)	(22.8)	(3.2)	(100.0)
In Doctoral Program	#	7	8	28	1	44
	% of total	(15.9)	(18.2)	(63.6)	(2.3)	(100.0)
Total in Minority Group	#	159	208	159	18	544
% of Total Minorities	#	29.2	38.2	29.2	3.3	100.0

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STUDENT ENROLLMENT BY SEX, 1971-72

UNDERGRADUATE MAJORS			GRADUATE STUDENTS		
Women	Men	Total	Women	Men	Total
2,711	15,596	18,307	673	5,639	6,312
15.1%	84.9%	100.0%	10.7%	89.3%	100.0%

MINORITY REPRESENTATION IN GEOSCIENCE ENROLLMENT, 1972

Type of Department	Total Enrolled	Minority Students	
		Number	Percent
Majors, all levels in degree-granting depts.	27,225	544	2.0
In 4-year schools, nonmajor depts.	8,956	429	4.8
In 2-year colleges	28,588	2,083	7.3

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