1. Program: SCIENCE AND ENGINEERING TECHNICIAN EDUCATION PROGRAM

2. Name of Institution: Santa Barbara City College
   Address: 721 Cliff Drive
   City: Santa Barbara  State: California  Zip: 93109

3. Glenn G. Gooder, Superintendent/President
   (Name and title of administrative official authorized to commit the
   institution to the conduct of the project)

4. Grant to (Institution): Santa Barbara Community College District
   (only if different from item 2)

5. Title of Project: Geoscience Technology Program

6. Project Director: David R. Williams
   Title and Academic Address: Professor, Physical Science - L8G 109
   Telephone (include area code): 805  965-0581  317
      Office  Extension
   Social Security Number of Project Director: 521-30-2726

7. Discipline(s) included in plan: Earth Science

8. Total support requested from NSF (round to nearest $100): $11,000

9. Proposed starting date: July 1, 1975

10. Proposed duration of grant: 12 months

11. Date submitted: April 2, 1975

12. Are funds for any parts of the project proposed herein being requested
    in another proposal to NSF or some other Federal agency? No
    (Funds have been requested under the NSF Instructional Scientific
    Equipment program for laboratory equipment which is not included
    in this application.)

David R. Williams
Professor, Physical Science

Glenn G. Gooder
Superintendent/President
Background

In recent years, enrollments in the Earth Sciences at Santa Barbara City College have been increasing at a faster rate than any other department on the campus. Although the Earth Sciences curriculum was designed to serve as lower division preparation for students planning to pursue a baccalaureate or graduate degree program, many of the students have found that they could obtain good positions in the Geosciences after only two years of study.

This led the staff to survey several employers to determine whether a two-year vocational program in Geoscience Technology would be appropriate. Eleven District Geologists and Managers from eight major oil companies were queried. All gave wholehearted support to the concept. Although no commitments were made to hire specific numbers of technicians, all agreed that the need would exceed the anticipated output of the Santa Barbara City College program.

More recently, in March, 1975, a total of 23 firms in the Houston, Texas, area were contacted, including geophysical, well-logging and petroleum-related contractors, and consultants. All expressed interest in the program, and several indicated great enthusiasm for future graduates.

In response to the 1973 survey the Earth Sciences staff began to plan a two-year program in Geoscience Technology. The program was developed around five criteria:

1) Necessity to develop job entry skills for employment as a para-professional in scientific and technological activities in Geology and Geophysics.
2) Necessity to provide a strong scientific and mathematical foundation, so that graduates could continue their professional growth in the future.

3) Necessity to include breadth as well as depth, so that graduates would have flexibility and adaptability to cope with future technological change.

4) Necessity to develop a program compatible with the resources of the College.

5) Necessity to develop a program which did not duplicate an established program in this region of the country.

An Earth Science Advisory Board was formed to help in planning the new curriculum. Present members of this Board are:

Dr. Harold H. Sullivan, Jr., Consulting Petroleum Geologist
Frank Donald Didier, Jr., Engineering Geologist
Whitney Skaling, Geologist
John F. Curran, Consulting Petroleum and Engineering Geologist
Larry Brundall, Founder of Geo Photo, Inc.
James E. Smalley, Engineering Geological Technician,
U. S. National Forest Service
Arne Junger, Geophysicist

This Board, with the Earth Science faculty, examined the existing curriculum and analyzed the skills, aptitudes, and education required of geoscience para-professionals, in accordance with the above criteria.

A survey of other California colleges revealed only two programs that were related. Orange Coast College has a program which is restricted to the training of oil well drilling foremen, and is concentrated on the theory and practice of operating drilling equipment. Cypress College has a Geologic Technician program which is much less specialized, and which prepares students for entry positions at a level comparable to Physical Science Technician in the U. S. Geological Survey. The program is limited by the
lack of a Geology or Earth Science Department, support staff, and equip-
ment. In contrast, SBCC has a well-equipped and well-staffed Earth Sciences
Department.

The existing curriculum was found to be consistent with the goals of
the proposed program, and was retained as the core of the new program.
Two new courses were developed for both professional and para-professional
students, and two others developed specifically for the technicians.

The first course, developed for both groups, was Geologic Literature
and Report Writing, introduced in Fall, 1974. It was evaluated as success-
ful by students, staff, and the Advisory Board. It is planned to offer
this course each Fall to 24 students.

In Spring, 1975, two new courses were introduced -- Geologic Illustra-
tion with 26 students and Introduction to Geophysical Methods with 19
students, the latter designed especially for the Geoscience Technology
major. A final new course, Geologic Field and Laboratory Methods, will
be introduced in Fall, 1975. About 30 students will be graduated each
year.

The Department of Earth Sciences at SBCC has a program of greater
depth and breadth, and a greater number of students than any other two-
year college in California. There are only two other community colleges
with comparable programs in the country. The staff consists of six
instructors and three support personnel.

In addition to the proposed Geo Tech program, the College offers two-
year technician programs in Computer Science, Marine Technology, and Elec-
tronic Technology. These programs all provide students with entry-level
skills in their respective fields, but without the option of proceeding
directly to upper division course work. A feature of the proposed Geo
Tech program is that the student would have this option.
The curriculum, as planned now, calls for a total of 69 units, including 37 in Earth Sciences, 8 in Physics, 4 in Chemistry, 6 in Mathematics, 12 in English Composition, History, and Government, and 2 in Physical Education. The graduate will have a solid foundation in both field and laboratory practice and instrumentation, and the principles of geology and geophysics, enabling him or her to perform useful para-professional work and/or to go on toward the baccalaureate degree.

Operational Plan

The development of the Geo Tech program is proceeding along the lines of the two-phase approach outlined in NSF Brochure E74-18, i.e., 1) Survey, adaptation, and development of materials, and 2) Implementation. At the present time, and for some time to come, these activities will be carried on concurrently. As noted above, three of the four new courses have been introduced. However, a great deal of development of course material needs to be done. The staff has been working on this material while carrying full teaching or support loads, and as a consequence, there has been insufficient time to survey the entire country for similar programs with which we might exchange materials, or to thoroughly search out appropriate commercially available materials. In general, it is expected that most materials will have to be developed especially for this program by the staff.

NSF funds, if forthcoming, will be used for the following activities:

1) Summer salary and released time for instructors and support staff to develop course materials, such as,
   a) Study guides and other text materials
   b) Illustrations, slides and demonstration materials, for lecture and laboratory use
c) Slides, audiotapes, and written exercises for auto-tutorial use by students

d) Rock, mineral, and fossil materials

2) Hiring of consultants in specialized areas to assist in development of methods of teaching highly specialized techniques and use of complex geophysical equipment.

3) Staff travel expenses to plan and arrange field trips to selected industrial laboratories and field sites.

4) Development of an intensive four-week summer field program to be introduced, if possible, Summer of 1976.

As the program is implemented, a continuous review process will be used to evaluate its effectiveness and to identify areas for improvement. This process will involve feedback from student surveys and consultation with the Advisory Board. It will also involve following graduates into their subsequent employment situations to determine where they have found their principal weaknesses and strengths to be on the job.

Resources

As noted above, SBCC has one of the most extensive programs in Earth Sciences among the community colleges of the United States. The staff consists of the following persons:

Instructors

Robert S. Gray, Associate Professor, PhD, Mineralogy, Optical Mineralogy and Petrology
Karl F. Halbach, Instructor, MA, Sedimentation and Stratigraphy
Joyce Mangle, Lecturer, MA, General Geology and Geowriting
Phil G. Olsen, Asst Professor, MA, Oceanography and Environmental Geology
David R. Williams, Professor, MA, Paleobotany and Palynology
C. Richard Willingham, Instructor, MA, Geophysics and Astrogeology
Support Staff

Tom C. Anderson, BA, Senior Geology Technician
Lois Blickenstaff, AA, Teacher Aide
Naomi E. Sullwold, AA, Geologic Illustrator and Cartographer

The Department is housed in a four-year-old building and has floor space of about 6,500 square feet in laboratory and utility space, including:

-- Mineralogy/petrology laboratory
-- General geology laboratory
-- Rock processing laboratory (for thin-section, rock, mineral, and fossil preparation)
-- Cartographic/illustration laboratory
-- General preparation laboratory, including photocopy equipment
-- Utility shop for welding, woodworking, and machine work
-- Tutorial laboratory, providing for 18 students, with Caramate rear screen auto-tutorial projectors

The Department is also well-endowed with modern geologic and geophysical equipment and instrumentation, including petrographic microscopes, Ingram thin-section equipment, sediment sample equipment for preparing, sorting, and drying, and a Kail projector/map-o-graph and varigraph.
### Budget (Preliminary) Fiscal Year 1976

#### A. Salaries and Wages

<table>
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<tr>
<th>Description</th>
<th>NSF</th>
<th>Other</th>
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<tr>
<td><strong>1. Senior Personnel</strong></td>
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<td>a. Project Director</td>
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<td>1) Summer salary ($11.00/hr, 90 hrs)</td>
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<td>2) Released time (20% during Fall and Winter semesters) substitute for 3 hrs/wk @ $12.00/hr, 32 weeks</td>
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<td>b. Faculty associates</td>
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<td>1) (One instructor, 20% released time, substitute 3 hrs/wk, 16 weeks @ $12.00/hr)</td>
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<td>2) Teaching of project-related courses</td>
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<td>a. Consultants</td>
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<td>b. Secretarial/Clerical (Teacher's Aide, 1/8 time, 12 months, @ $752/mo)</td>
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<td>c. Technician (1/8 time, 12 months, @ $962/mo)</td>
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<td>d. Geologic Illustrator/Cartographer (1/8 time, 12 months at $752/mo)</td>
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<td><strong>TOTAL SALARIES AND WAGES</strong></td>
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<td>$7,692</td>
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</table>

| Description                                                                 |       |       |       |
| B. Fringe Benefits                                                          | 1,553 | 696   | 2,249 |

| Description                                                                 |       |       |       |
| C. TOTAL SALARIES, WAGES AND FRINGE BENEFITS                                | $8,664 | $8,388 | $17,052 |

| Description                                                                 |       |       |       |
| D. Permanent Equipment                                                      | ---   | ---   | ---   |
| E. Expendable Equipment/Supplies                                            | 1,549 |       | 1,549 |
| F. Travel                                                                   |       |       |       |
| a. Staff                                                                    | 725   |       | 725   |
| b. Consultants                                                              | 100   |       | 100   |
| G. Office Supplies/Communications                                          |       | 500   | 500   |
| H. Computer Costs                                                           | ---   | ---   | ---   |
| I. Other                                                                    |       |       |       |
| J. Total Direct Costs                                                       | $11,038 | $8,888 | $19,926 |
| K. Indirect Costs (14%)                                                     | ---   | 2,790 | 2,790 |
| L. Total Costs                                                              | $11,038 | $11,678 | $22,716 |
| M. Total Budget Rounded Amount of Award                                     | $11,000 | $12,000 | $23,000 |