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CHEMICAL RESEARCH, DEVELOPMENT & ENGINEERING CENTER

CRDEC-SP-056

U.S. ARMY CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER'S PARTICIPATION IN THE SUMMER FACULTY PROGRAMS

Mary L. Doak

PROGRAM RESOURCE MANAGEMENT DIRECTORATE

July 1992

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U.S. ARMY ARMAMENT MUNITIONS CHEMICAL COMMAND

Aberdeen Proving Ground, Maryland 21010-5423

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Each year, CRDEC annually sponsors the Summer Faculty Research and Engineering Program (SFREP) and the Summer Associateship Program for High School Science and Mathematics Faculty (HSSMF). These summer programs are administered by the U.S. Army Research Office, Research Triangle Park, NC. Under the auspices of the SFREP, university professors are awarded up to a 12-week summer position at a Government laboratory/center to conduct or assist in a research or engineering project. The HSSMF Program is a 10-week program in which secondary school teachers are contracted to conduct or assist in science or mathematics projects at a Government laboratory/center. One of the main objectives of these programs is to provide a personal experience base from which faculty members may counsel and encourage students to seek science and mathematics curricula. The CRDEC has participated in both programs since inception and positive results have been achieved. Past summer achievements have contributed greatly to CRDEC's mission accomplishments and our nation's chemical defense program.

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PREFACE

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1. INTRODUCTION

Each year, the U.S. Army Chemical Research, Development and Engineering Center (CRDEC) sponsors the Summer Faculty Research and Engineering Program (SFREP) and the Summer Associateship Program for High School Science and Mathematics Faculty (HSSMF). These summer programs are administered by the U.S. Army Research Office, Research Triangle Park, North Carolina under the Scientific Service Program (SSP) task type competitive contract with Battelle Memorial Institute (BMI), Research Triangle Park, N.C. These programs were established at the request of the Assistant Secretary of the Army (Research, Development and Acquisition) and the Assistant Deputy Chief of Staff for Personnel in 1983 and 1984 respectively. CRDEC has participated in both programs from inception and positive results have been achieved. Since 1986, I have been the CRDEC Scientific Services Program Coordinator responsible for coordinating and managing all CRDEC SSP activities.

The objectives of this paper are to:

(a) Familiarize the audience with the Summer Faculty Programs.

(b) Describe how CRDEC executes the programs.

(c) Summarize CRDEC's participation in the programs over the past 6 years.

(d) Highlight the major advantages and successes of the programs.

2. PROGRAM DESCRIPTION

Under the auspices of the SFREP, university faculty members are awarded a summer position for 12 weeks at a Government laboratory or center to conduct or assist in a research or engineering project. The objectives of this program are to:

a. Further research interests of the U.S. Army.

b. Stimulate communication between university, college and

technical institution faculty members and Army professionals.

c. Enhance research capabilities of university, college and technical institution scientists.

Under the SFREP, faculty members are paid an $800.00 per week salary and authorized per diem at $45.00/day, 7 days/week starting two days before the first working day and ending not later than 2 days after the last working day. Per diem is not paid when travel subsistence is paid. Two round trips from the candidate's permanent address and sponsoring agency are authorized. The first trip is for an orientation visit and the second is for start and completion of the summer appointment. In addition to receiving a technical orientation, candidates use the first trip to make living arrangements and to define work or request required supplies including mobility badges. Most first-time associates, outside the commuting range, elect to fly for the orientation visit and drive for the working period. An orientation visit for previous participants is not normally authorized. Auto travel at 24 cents per mile or auto rental at $50.00 per day is authorized. If the candidate's place of residence is within reasonable commuting distance of the laboratory, travel will be considered local and the faculty member will not be permitted a daily mileage allowance. The faculty member is authorized to return to his/her place of residence on weekends, holidays, or other periods of non-duty; however, the Government will not reimburse the faculty member for such trips.

The HSSMF program is a 10-week program in which high school and middle school faculty members are hired during the summer to conduct or assist in science and mathematics projects in Government laboratories/centers. The objectives of this program are very similar to the SFREP in that the program extends research interests of the Army and will:

a. Provide a working exposure to U.S. Army research and development activities in a laboratory environment.

b. Enhance science and mathematics research and teaching abilities.

c. Develop a practical appreciation of the professional challenges under-taken by scientists and engineers.

d. Provide high school teachers a personal experience base from which teachers may stimulate counsel and encourage students to undertake and continue science and mathematics curricula.

Under the high school program a $600/week salary is paid to the faculty member. No travel, per diem or subsistence is authorized since participants must live within commuting distance of the laboratory or center. Summer associateships are not

intended to be awarded to previous year participants unless a justification is received and is approved or disapproved by the ARO Contracting Officer. ARO funds approximately 50 associateships each year. CRDEC normally receives three of these free associateships on a buy one get one free basis. The number of free associateships are based on the number of funded SSP activities of the laboratory/center during the previous year.

3. PROGRAM EXECUTION (See **Table 1** for Program Schedule.)

During the early fall time frame (Sep-Oct) ARO contacts Army laboratories/centers to determine "areas of research interest" for inclusion in the annual application/program announcement. The prime contractor BMI prepares two announcements, one for each summer program. The program application/announcement contains the program description, terms and conditions, research interests of participating Army laboratories/centers and specific instructions to the applicants. BMI sends these applications/program announcements to high schools within the vicinity of all Army laboratories/centers and to universities, colleges, and technical institutions throughout the United States during the (Nov-Dec) time frame. Interested applicants are required to submit a resume and select a first and second choice of laboratory/center locations where their expertise would be the most beneficial and within commuting distance (for the high school program only).

Applications are collected by BMI, sorted, and sent to the appropriate Army laboratories/centers along with a cover letter and candidate recommendation forms detailing the following.

a. Number of free high school appointments

b. Names of applicants and home institutions

c. Suspense date for responding

d. Any changes in the program

Upon receipt of CRDEC applications, I conduct a preliminary review of the applications noting areas of expertise and repeating applicants to help expedite the selection process. Applications are then sent to the appropriate CRDEC directorates/offices with a suspense date for a more in-depth review and final selection of summer faculty members. Candidate recommendation forms are completed by the selecting CRDEC directorates/offices including a statement of work and a first and second choice of candidates. Funding documents are prepared and processed 2-3 days prior to submission by the selecting CRDEC directorates/offices and are forwarded along with the candidate recommendation forms back to me for final review for accuracy in completion. Free associateships are distributed among CRDEC directorates/offices on a first response, first served basis, unless otherwise directed by the

CRDEC Associate Director for Technology. A consolidated CRDEC response is then prepared and forwarded to ARO. I maintain close telephone contact with Mr. Fred Hawkins (ARO Procurement Specialist) and Mr. Hodges Throckmorton (ARO Contracting Officer), to ensure the faculty members of CRDEC's choice are awarded the summer positions. Negotiations on availability and subsequent awards are conducted by Mr. Throckmorton, ARO Contracting Officer and Mr. Gary Hill, BMI Summer Programs Coordinator. Awards are normally processed within thirty days of receipt of the candidate recommendation forms (approximately 15 May 92).

Since FY 89, at the end of their summer appointments, CRDEC holds a Farewell Reception/Award Ceremony where the summer faculty members are presented with Certificates of Achievement by our Technical Director. This event is covered by our Public Affairs Office and is published in local newspapers to highlight their achievements and foster new interest among the local educational community.

4. PROGRAM PARTICIPATION

4.1 SFREP Statistics

a. The number of applicants has increased from 41 in FY 87 to 78 in FY 92. Historical data shows a increasing decline in the program when in FY 90 applicants dropped to a low 25. BMI contributed this decline to the salary remaining constant for 5 years in a row. In FY 91, when the salary was raised from $750.00/week to $800.00/week and the per diem was increased from $40.00 per day to $45.00 per day, the number of applicants more than doubled. CRDEC's participation in the program seems to vary somewhat due to the expertise of the applicants and to the availability of funds; however, FY 91 was also our most active year. (See **Table 2**).

b. The percentage of applicants awarded positions from minority institutions fluctuates between 20-30% per year, well above the DOD goal of 5%. The percentage of female awards averages 12% per year. I believe that in the next few years we should see an increase in this statistic since more women are seeking science and engineering professions. (See **Table 3**).

4.2 SFREP Program Summary

a. The following are highlights of the research conducted by various professors during the past six years.

(1) Dr. Pallassana Krishnan, Professor of Chemistry at Coppin State College, during FY 89, conducted studies on understanding Wetlerlite chemistry (uses of charcoal in filters)

and the role of different impregnation materials in charcoal filters. Upon lecturing his students on his experiences at CRDEC, one of Professor Krishnan's students took on a class project where he studied the effects of ammonia gas on charcoal filters, which is of interest to CRDEC. Dr. Krishnan, during FY 91, developed several algorithms for understanding, characterizing, and predicting the flexibility of polymers. These algorithms are used to examine how contaminants (both agents and simulants) affect polymer flexibility. Dr. Krishnan recently completed a one-year sabbatical at CRDEC where he used theoretical chemistry to examine polymer properties for use in developing new and improved chemical simulants. Dr. Krishnan will be a seven year veteran of CRDEC this year.

(2) Dr. Steven Brown, Associate Professor at the University of Delaware, developed artificial intelligence and pattern recognition methods to analyze pyrolysis time profiles and mass spectra using complex bioprofiles from the Chemical/Biological Mass Spectrometer used for chemical and biological detection.

(3) Dr. Robert Morris, Professor of Physics at Coppin State College, investigated the possibility of utilizing molecular orbital techniques to predict a variety of standard polymer properties for characterizing how a polymer will behave in a given situation/medium.

(4) Dr. John Barton, Associate Professor within the Mechanical Engineering Department at the University of Nebraska-Lincoln, in FY 91, developed formalisms and procedures for determining electromagnetic fields in particles simulating bacteria under focused laser irradiation. Systematic calculations were performed to determine the location of regions of high stress and potential rupture of particle walls as a function of laser wavelength. These studies are the first known efforts to calculate electromagnetic fields within particles under laser radiation.

(5) Dr. Norman Witriol, Physics Professor at Louisiana Technical University, calculated the reaction of chemicals which are of interest to CRDEC. His work also included predicting the energy requirements to produce these reactions. Dr. Witriol's interest, knowledge, and enthusiasm led him to accept a one-year Intergovernmental Personnel Agreement with U.S. Army Ballistics Research Laboratory, a neighbor of CRDEC.

b. **Table 4** lists the names and home institutions of past and present faculty members. **Table 4a** displays their geographic locations across the United States. **Table 4b** is a listing the universities and their corresponding city and state.

5. ADVANTAGES/SUCCESSES
5.1 SFREP

a. The cost of doing business is a major advantage of this program. A small amount of funding, normally Technology Base, is invested in the SFREP each year. This investment, which averages $11K per faculty member, is less than half the cost of a full-time permanent employee for that same amount of time. (See **Table 5**). This year, in addition to a cost savings, the advantage of being able to add seven PhDs to our staff is a welcome relief from the hiring freeze. Despite their short detail, CRDEC receives a huge return each year on this investment by receiving an exchange of ideas and technology from the academic community. Networks are established for collaborative research efforts which continue well beyond the 12-week period.

b. CRDEC has been very fortunate to enlist the services of world renowned scientists such as Dr. Sidney Katz, Rutgers University, who is an expert in the role and fate of trace elements in biological and environmental systems and Dr. Hendrick Muezelaar, University of Utah, who is an expert in mass spectrometric techniques and gas chromotography/ion mobility spectrometry. Dr. Katz will be a four-year veteran and Dr. Muezelaar will be a three-year veteran of CRDEC this year.

c. I have been successful in obtaining waivers from the requirement of "continuous research" at CRDEC on three separate occasions. In FY 90, Dr. Daniel Hammer was allowed to perform 100% of the effort at Cornell University since the work required highly specialized equipment which was not available at CRDEC. The second occasion was in FY 91 when Dr. Barbara Mann, University of Virginia, was allowed to perform all but two weeks at her home institution since the work required a certified genetic engineering laboratory not available at that time at CRDEC. The third waiver was granted to Dr. Hendrick Meuzelaar, University of Utah, in FY 91, when a previous commitment prevented him from working 10 consecutive weeks. Professor Meuzelaar split the performance period into two 5-week terms. These waivers were one-time approvals granted graciously by Mr. Throckmorton, ARO Contracting Officer.

d. Two patent disclosures have been filed against work accomplished through this summer program: Dr. Hendrick Muezelaar's work on a fully integrated gas chromatography/direct air sampling, ion mobility spectrometry device and Dr. Barbara Mann's work on studying the use of polymerase chain reaction to detect pathogens in environmental samples.

As evidenced by the accomplishments and potential patent applications, the objectives of this program are certainly being met. The work of the professors support many current and future research and development programs which will provide our nation's armed forces with the means to defend and protect themselves on the

chemical/biological battlefield. Also, the experiences and new ideas in scientific research that they encountered at CRDEC will further their professions.

5.2 HSSMF Statistics

a. The number of applicants under this program has increased from 11 in FY 87 to 17 in FY 92. Historical data shows nearly a 50% increase from FY 89 to FY 90 even though the salary remained constant between these years. The reason for this increase will be discussed under ADVANTAGES/SUCCESSES below. CRDEC's participation in the program averages seven associateships per year. (See **Table 6**).

b. Female participation in the program averages 55% per year. (See **Table 7**).

5.3 HSSMF Program Summary

a. The summer positions over the past 6 years included a variety of research projects which helped to further our nation's chemical and biological defense program. The following are samples of the summer achievements conducted by Northeastern Maryland secondary school educators at CRDEC.

(1) Mr. Edward Fleming, Earth Sciences and Math Teacher, completed a laboratory validation procedure which analyzed the detection limits of chloractephenone, a form of tear gas. His work in spectrophotometry also helped to save time in preparing reagents (substances used in chemical reactions to detect, measure, examine, and produce other substances) for lab work, as well as reducing the generation of laboratory waste.

(2) Mr. Raymond Reinhardt, Mathematics and Computer Teacher, wrote a computer program for laser stand-off systems which is capable of statistically analyzing and graphically displaying data while trying to detect chemical agents.

(3) Ms. Sherry Dagostin, Science Teacher, assisted in aquatic toxicity studies on smoke and pilot plant materials by maintaining test organisms and testing the effects of toxicants on daphnia, algae and fish.

(4) Ms. Jane White, Mathematics Teacher, evaluated an existing carbon impregnating process and the associated analytical data to determine the effects of process conditions on adsorptive capacity of the carbon.

(5) Mr. William Forster, Biology Teacher, assisted in database input on the environmental aspects of smoke/obscurants. In addition, he also assisted in conducting environmental toxicity tests on plants.

(6) Ms. Holly Spangler, Life Sciences, Physical Science and Health Instructor, conducted literature searches on heat stable enzymes and prepared a report on her research. This work was used to support CRDEC studies for the Bio-Chemical Detector and the Biotechnology Program.

(7) Mr. Thomas Trafton, Biology and Earth Science Teacher, conducted literature searches to obtain data on mammalian and aquatic toxicology and environmental fate and effects of smoke materials such as fog oil, hydrocarbons, and red and white phosphorus. He also conducted research on the transport of these materials in soil. Mr. Trafton will be a six year veteran of CRDEC this year.

b. **Table 8** lists the names and home institutions of past and present faculty members.

6. ADVANTAGES/SUCCESSES

HSSMF

a. The cost of doing business is again a major advantage of this program. CRDEC has been able to secure the services of an average of 7 faculty members for a low average total cost of $21K per year of normally Technology Base funding compared to $133K we would have spent in-house. (See **Table 9** for specific cost details).

b. As previously mentioned, in FY 90, the program participation nearly doubled. This was the result of my efforts to foster new applicant interest in the program. I verbally contacted and wrote a letter to the Harford County Board of Education requesting that this program be announced in their next published newsletter. In addition, a list of new science and mathematics faculty members was requested and letters were sent to each of them announcing and describing the opportunities that exist within this program. To further enhance interest in the program, I made a personal appearance at an "Adopt-A-School" seminar and handed out HSSMF announcements/applications and answered questions. Under this program, free associateships are only granted for new applicants. In order to take advantage of the free research opportunity, I had to try and find new applicants. In FY 91, the number of applicants remained constant and in FY 92, one additional application was received. (See **Table 6**).

c. In FY 88, CRDEC was authorized 4 free associateships to be funded by ARO; however, only three out of the 7 applicants were new applicants that year. I sent a letter to the ARO Contracting Officer and asked for a waiver to allow a repeating faculty member to become our fourth free associateship and the waiver was approved. Since then, I have been successful in enlisting repeating candidates as long as sound, written justifications are

provided to the ARO Contracting Officer for approval.

d. Upon completion of each summer appointment, BMI requests a critique of the program from faculty members. (See **Table 10**). The first question asked is "How would you generally describe your summer experience?" In FY91, 94% of the associates felt that they had received challenging assignments, had gained valuable experience and enjoyed their association with CRDEC personnel and equipment. Five percent described their experiences in moderately positive terms and one person described their experiences in less than positive terms, primarily because of a lack of direction from the supervisor. The following are a few comments from the faculty members which I would like to share:

"I had the opportunity to assemble and use problem solving activities which emphasized the problem solving strategies that were familiar to me but not used extensively in my classes. I've been motivated to go back to my classes and use these activities regularly."

"With the experience I have gained working at CRDEC, I will be able to teach and show my students how to conduct laboratory work in the classroom in a manner reflecting today's scientific procedures. I will also use this background to help those who transition from middle school science to high school science."

"My summer experience at CRDEC was both interesting and rewarding. I have a greater appreciation and understanding of a research and development laboratory. This experience will enable me to better communicate to my students the advantages of scientific careers."

It is apparent that the objectives set forth by the U.S. Army Research Office are being met by this program. The most prevalent factor, discovered through the survey and in personal conversations, was that they felt it was a rewarding experience since they were given the opportunity to be a part of the actual research rather than serving a peripheral role. With many secondary schools lacking the latest in scientific equipment, this program offers the educators a chance to work with state-of-the-art devices used at CRDEC and pass their experiences on to their students. If asked to tell their students what they did over the summer, these educators would have quite a story to tell. Besides working in a scientific research organization, these individuals contributed to furthering our nation's armed forces' preparedness in fighting on the chemical battlefield and deterring the use of chemical weapons.

TABLE 1.
PROGRAM SCHEDULE

ANNUAL CALL FOR AREAS OF INTEREST	SEP-OCT
PROGRAM APPLICATION/ANNOUNCEMENT DISTRIBUTION	NOV-DEC
RECEIPT OF APPLICATIONS	JAN-FEB
DEADLINE FOR RECOMMENDATIONS	FEB-MAR
AWARDS ARE MADE	APR-MAY
FACULTY MEMBERS BEGIN	MAY-JUN
ACHIEVEMENT AWARDS CEREMONY	AUG-SEP

TABLE 2.

APPLICATIONS / AWARDS

PROGRAM STATISTICS - SFREP

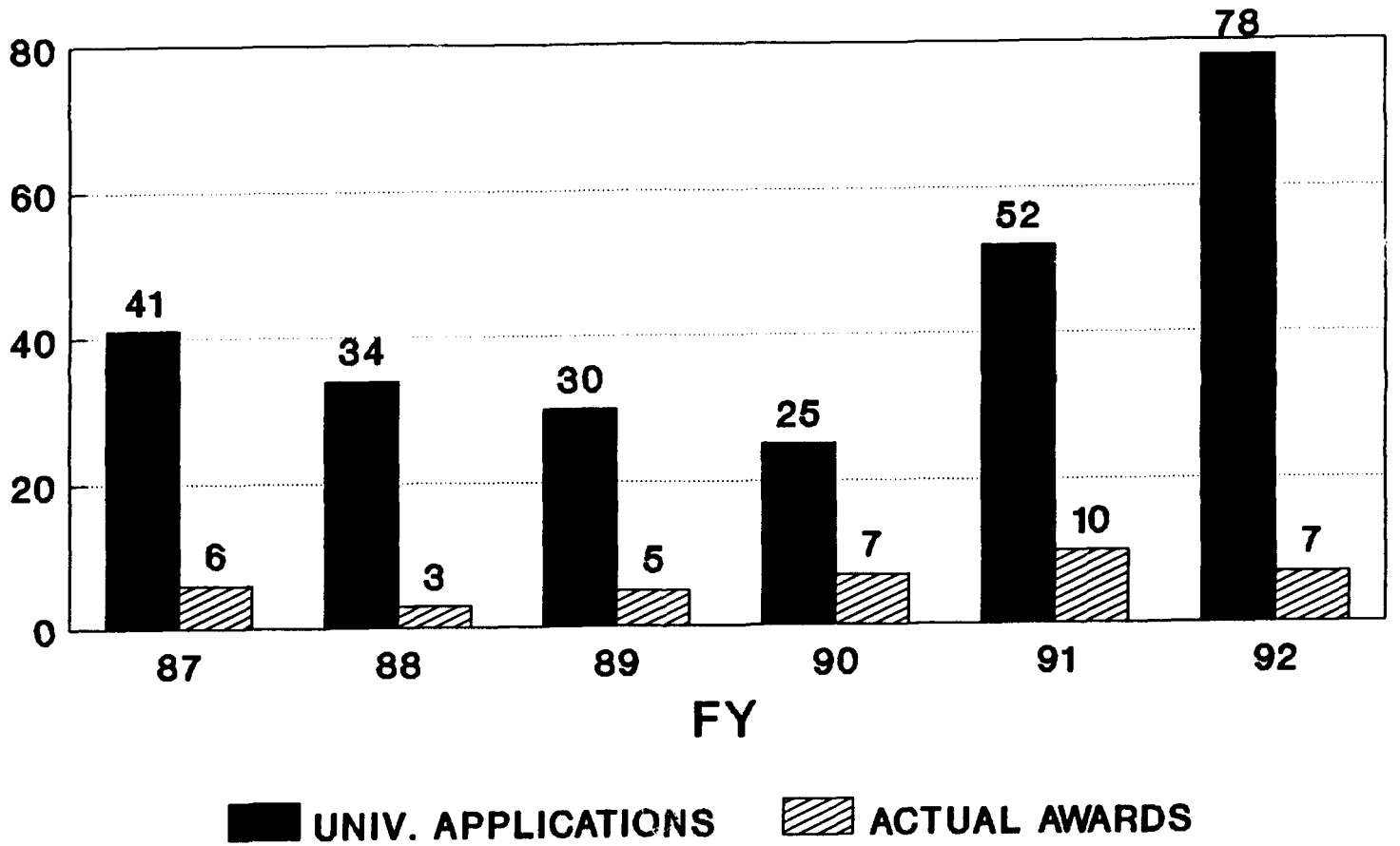
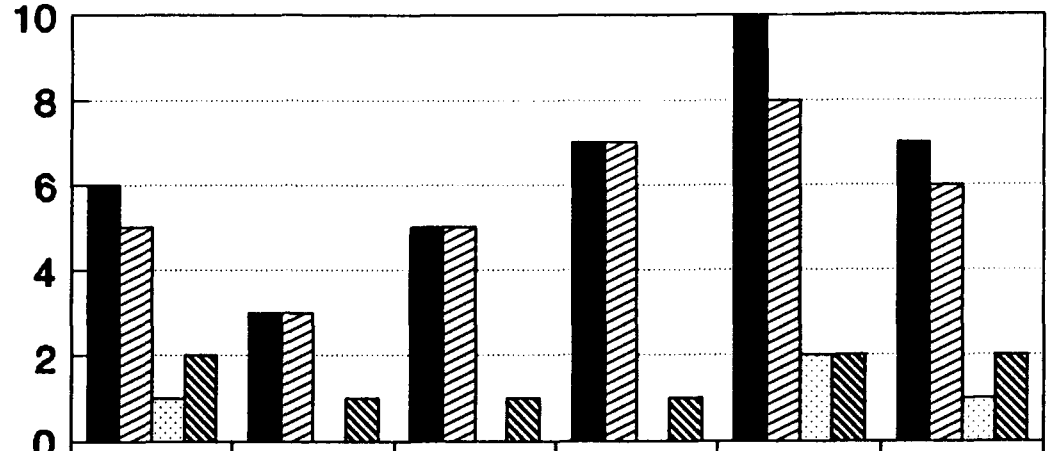


TABLE 3.

STATISTICS - SFREP



FY	87	88	89	90	91	92
NO. OF PARTICIPANTS	6	3	5	7	10	7
NO. OF MALES	5	3	5	7	8	6
NO. OF FEMALES	1	0	0	0	2	1
MINORITY INST.	2	1	1	1	2	2

TABLE 4.

SFREP PROGRAM PARTICIPANTS

CRDEC SPONSOR	FACULTY MEMBER	HOME INSTITUTION	DEPARTMENT
FY87			
Dr. Harry Salem	Dr. Sidney Katz	Rutgers State University	Chemistry
Dr. Dennis Reutter	Dr. Leland Wilson	Loma Linda University	Chemistry
Dr. Joseph De Frank	Dr. Linchun Walls	Morgan State University	Chemistry
Dr. Fu-Lian Hsu	Mr. Peter Harrington	SUNY of Binghamton	Chemistry
Dr. Ed Poziomek	Dr. Pallassana Krishnan	Coppin State College	Chemistry
Dr. Richard Smardzewski	Dr. Sterling Tomellini	University of New Hampshire	Chemistry
FY88			
Dr. Harry Salem	Dr. Sidney Katz	Rutgers University	Chemistry
Mr. George Famini	Dr. Hendrik Hameka	University of Pennsylvania	Chemistry
Dr. Amnon Birenzvige	Dr. P. Krishnan	Coppin State College	Chemistry
FY89			
Mr. George Famini	Dr. Norman Witriol	Louisiana Tech University	Physics
Dr. James Jensen	Dr. Hendrik Hameka	University of Pennsylvania	Chemistry
Dr. James Jensen	Dr. Hae-Won Kim	Penn State University	Chemistry
Mr. George Famini	Dr. Daniel Zeroka	Lehigh University	Chemistry
Dr. Amnon Birenzvige	Dr. Pallassana Krishnan	Coppin State University	Chemistry
FY90			
Dr. James Jensen	Dr. Hendrik Hameka	University of Pennsylvania	Chemistry
Dr. James Jensen	Dr. Daniel Zeroka	Lehigh University	Chemistry
Mr. George Famini	Dr. Pallassana Krishnan	Coppin State College	Chemistry & Physical Science
Dr. Thaiya Krishnamurthy	Mr. Charles Hauer	University of Virginia	Chemistry
Dr. Peter Snyder	Dr. Hendrick Meuzelaar	University of Utah	Material Science & Engineering
Dr. Sheila Wood	Dr. Daniel Hammer	Cornell University	
Dr. James Jensen	Mr. Charles Schmitt	Towson State University	Computer/Information Sciences

TABLE 4. SFREP PROGRAM PARTICIPANTS (Continued)

FY91			
Dr. James Jensen	Dr. Hendrik Hameka	University of Pennsylvania	Chemistry
Dr. James Jensen	Dr. Daniel Zeroka	Lehigh University	Chemistry
Dr. Dennis Reutter	Dr. Robert Morris	Coppin State University	Natural Science
Dr. Dennis Reutter	Dr. Pallassana Krishman	Coppin State College	Chemistry
Mr. George Famini	Dr. Susanna Wei	Towson State University	Computer/Information Sciences
Dr. Randolph Long	Dr. John Barton	University Nebraska-Lincoln	Mechanical Engineering
Dr. Peter Snyder	Dr. Hendrik Meuzelaar	University of Utah	Material Science & Engineering
Dr. Sheila Wood	Dr. Barbara Mann	University of Virginia	Infectious Disease
Dr. Burt Bronk	Dr. Steven Druger	Northwestern University	Chemistry
Mr. William Ashman	Dr. Steven Brown	University of Delaware	Chemistry
FY92			
Mr. George Famini	Dr. Terry Green	Bethune-Cookman College	Chemistry
Mr. George Famini	Dr. Susanna Wei	Towson State University	Computer/Information Sciences
Mr. George Famini	Dr. Robert Morris	Coppin State College	Physics
Dr. Harry Salem	Dr. Sidney Katz	Rutgers University	Chemistry
Dr. Randolph Long	Dr. John Barton	University of Nebraska-Lincoln	Mechanical Engineering
Dr. Steven Harvy	Dr. Michael Betenbaugh	Johns Hopkins University	Chemical Engineering
Dr. Emory Sarver	Dr. Richard Plishka	University of Scranton	Computer Sciences

TABLE 4a.
GEOGRAPHIC LOCATIONS OF PARTICIPANTS

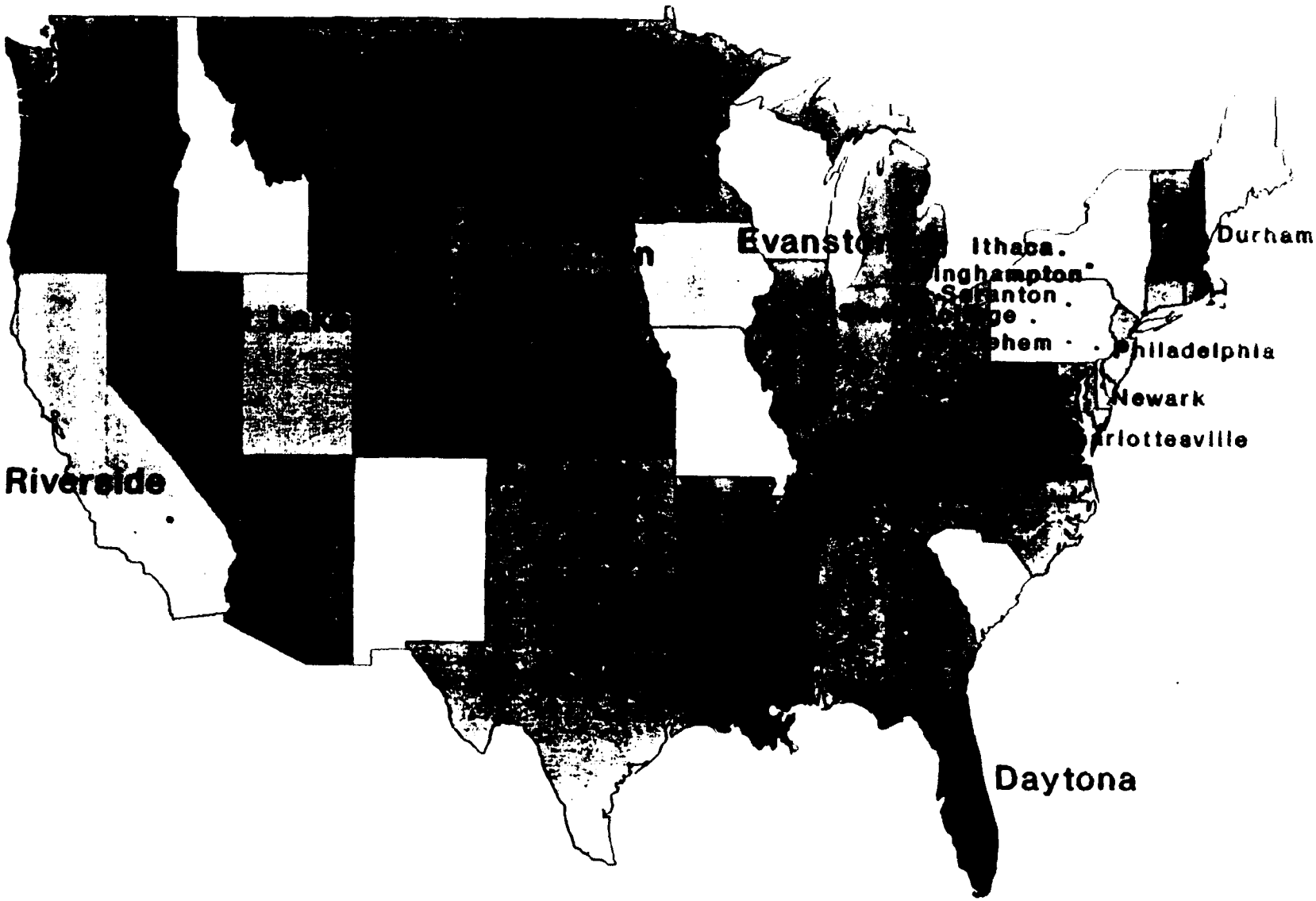


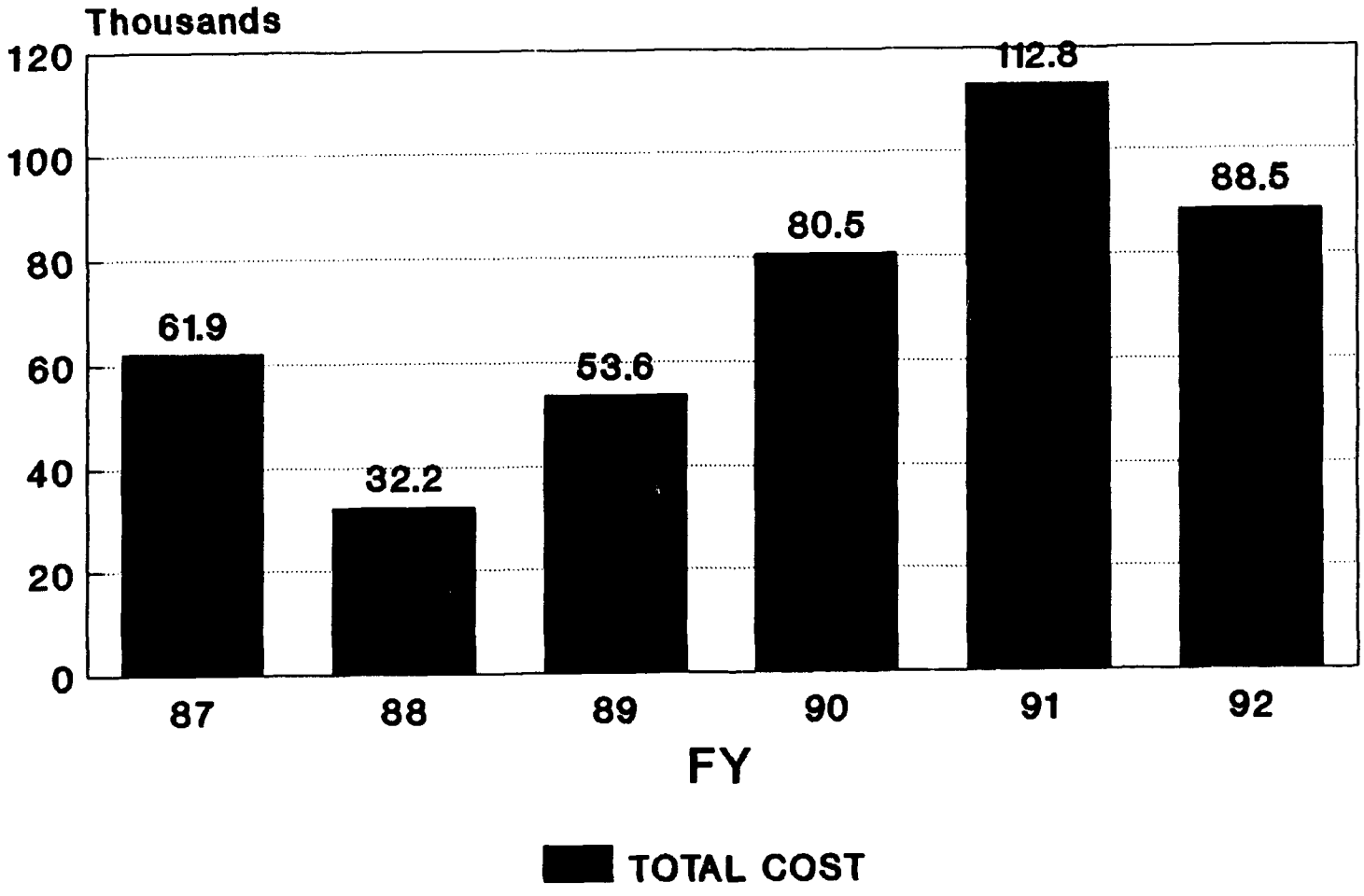
TABLE 4b.

SUMMER FACULTY PROGRAM
UNIVERSITIES

Bethune - Cookman College	Daytona, Florida
Coppin State College	Baltimore, Maryland
Towson State University	Towson, Maryland
Rutgers University	Camden, New Jersey
University of Nebraska-Lincoln	Lincoln, Nebraska
Johns Hopkins University	Baltimore, Maryland
University of Scranton	Scranton, Pennsylvania
Loma Linda University	Riverside, California
Morgan State University	Baltimore, Maryland
SUNY of Binghamton	Binghamton, New York
University of New Hampshire	Durham, New Hampshire
University of Pennsylvania	Philadelphia, Pennsylvania
Pennsylvania State University	State College, Pennsylvania
Lehigh University	Bethleham, Pennsylvania
Louisiana Tech University	Ruston, Louisiana
University of Virginia	Charlottsville, Virginia
University of Utah	Salt Lake City, Utah
Cornell University	Ithaca, New York
Northwestern University	Evanston, Illinois
University of Delaware	Newark, Delaware

TABLE 5.

COST - SFREP



Note: Numbers in bars correspond to total participants per year

TABLE 6.

APPLICATIONS / AWARDS

PROGRAM STATISTICS - HSSMF

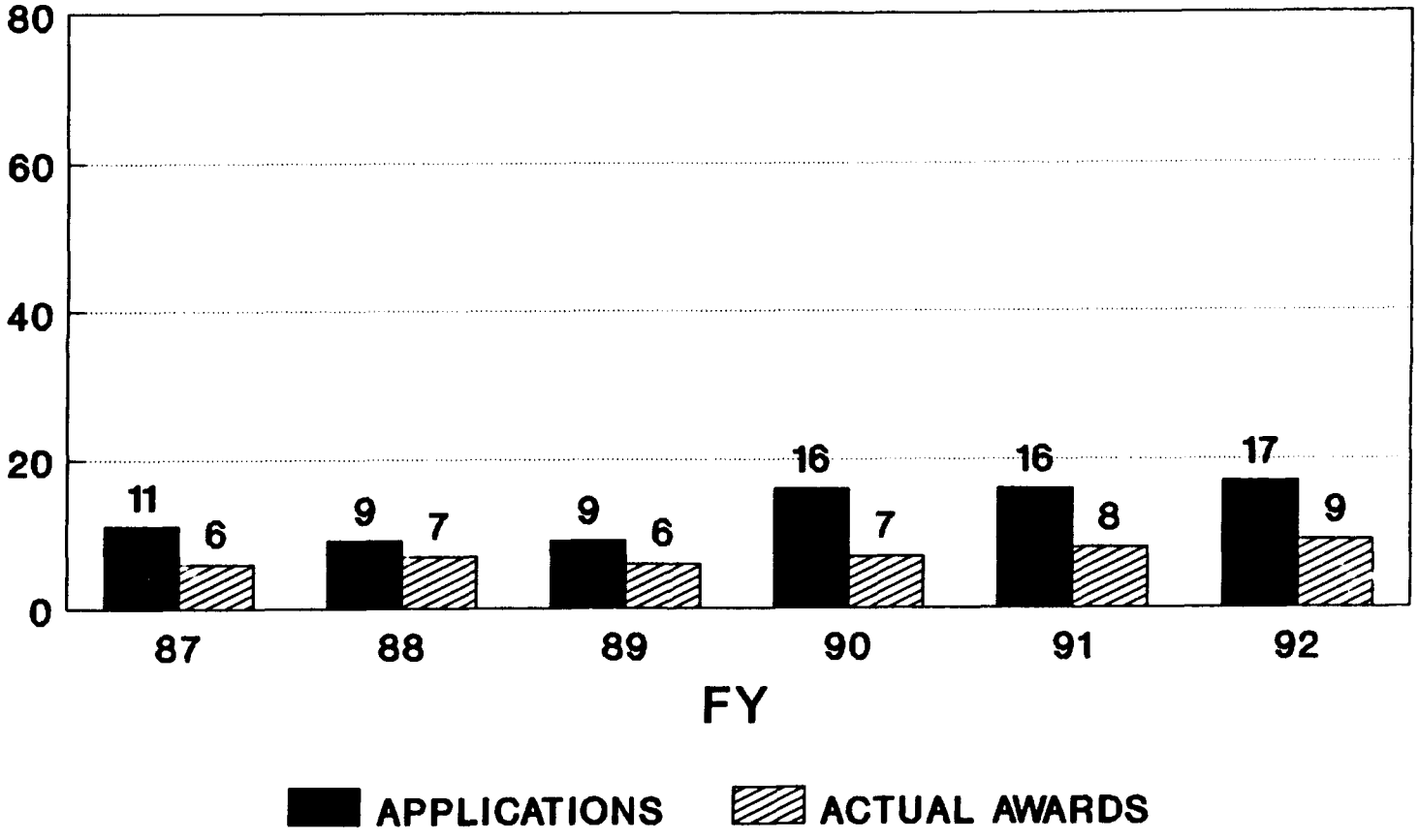
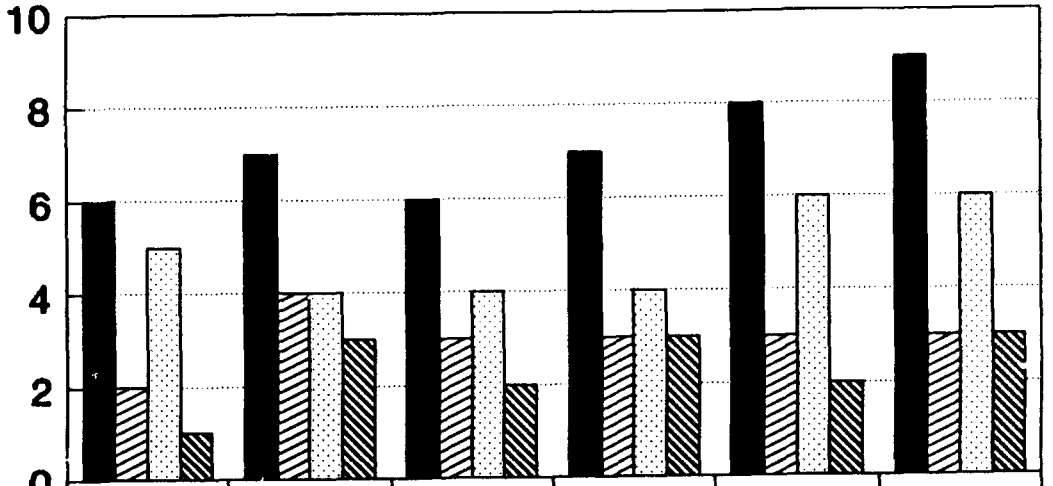


TABLE 7.

STATISTICS - HSSMF



FY	87	88	89	90	91	92
NO. OF PARTICIPANTS	6	7	6	7	8	9
NO. OF FREEBIES	2	4	3	3	3	3
NO. OF MALES	5	4	4	4	6	6
NO. OF FEMALES	1	3	2	3	2	3

NO. OF PARTICIPANTS NO. OF FREEBIES
NO. OF MALES NO. OF FEMALES

TABLE 8.
HIGH SCHOOL PROGRAM PARTICIPANTS

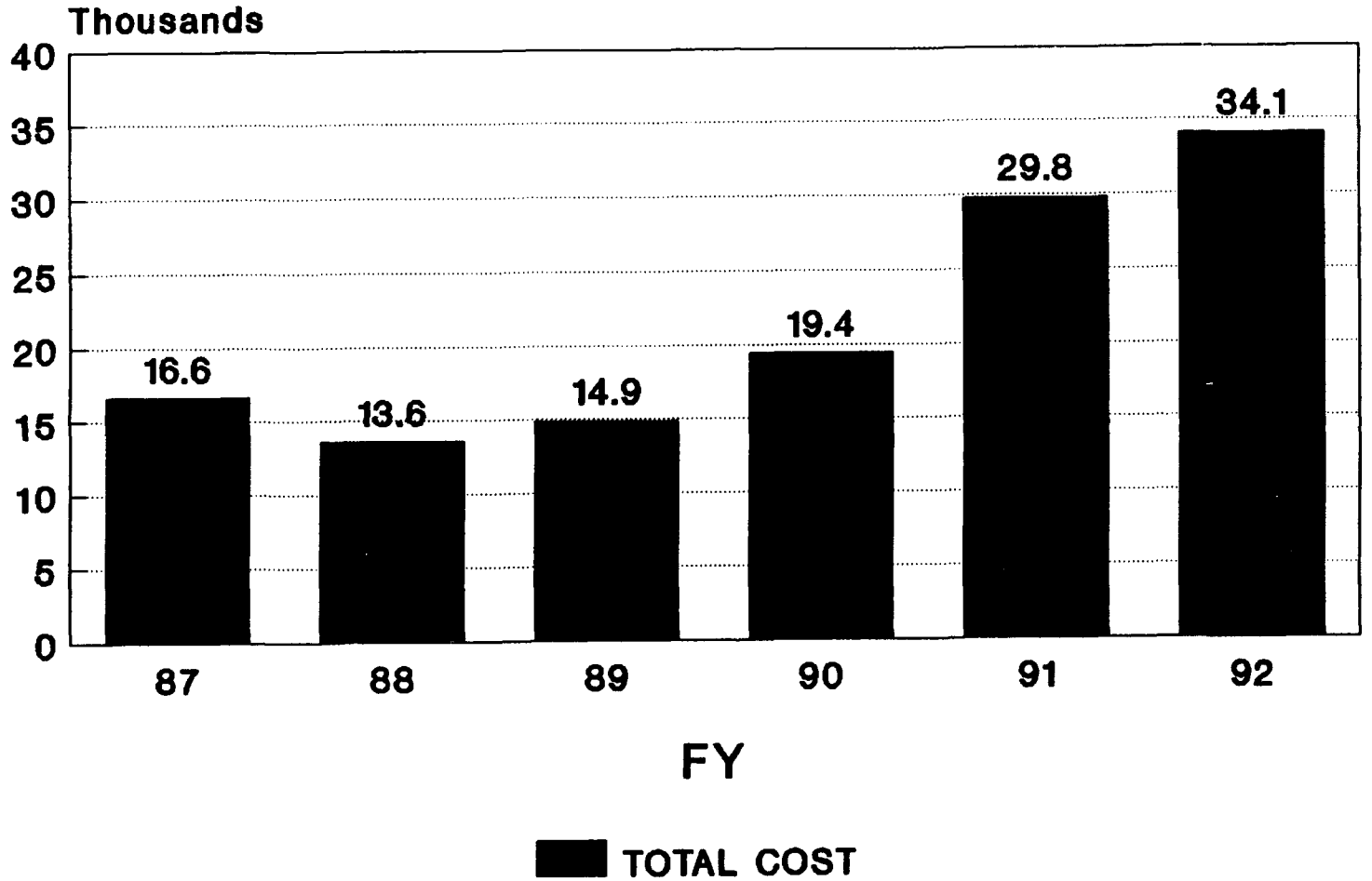
CRDEC SPONSOR	FACULTY MEMBER	HOME INSTITUTION	EXPERTISE
FY87			
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science, Astronomy
Dr. Richard Smardzewski	Mr. Edward Fleming	Bel Air Middle School	Earth Science & Mathematics
Dr. Edward Poziomek	Ms. Ann Souther	Harford Vocational Technical High School	Science & Mathematics
Dr. F. Prescott Ward	Mr. Joseph Congersky	Edgewood High School	Science
Dr. Phillip Koga	Mr. Ralph Trautwein	C. Milton Wright High School	Biology
Mr. Mohsen Mabrouk	Mr. George Diacoyanis	North Harford High School	Science
FY88			
Mr. Ilya Elashvili	Ms. Barbara Jewett	Oakland Mills High School	Chemistry
Dr. Pete Snyder	Mr. Charles Cross	Elkton High School	Chemistry/Physics
Dr. Charles Harden	Mr. George Diacoyanis	North Harford High School	Science
Dr. Homer Yeh	Ms. Delores Biggs	Balt. Polytechnical Inst.	Science
Dr. Richard Smardzewski	Mr. Edward Fleming	Bel Air Middle School	Earth Science & Mathematics
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science & Astronomy
Mr. Ilya Elashvili	Ms. Sharyn Denbow	C. Milton Wright High School	Chemistry
FY89			
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science, Astronomy
Mrs. Margarite Brooks	Mr. Alan DeGennaro	Frances Scott Key High School	Science Specialist
Mr. Thomas Gervansoni	Ms. Holly Spangler	Largo High School	Life Science, Physical Science & Health
Mr. John Fiala	Ms. Anne Souther	Harford Vocational Tech High School	Science & Mathematics
Mr. Steve Gotoff	Mr. Raymond Reinhardt	Patapsco High School	Mathematics & Computers
Mrs. Margarite Brooks	Mr. Edward Fleming	Bel Air High School	Earth Science & Mathematics

TABLE 8. HIGH SCHOOL PROGRAM PARTICIPANTS (Continued)

FY90			
Dr. James Baker	Ms. Mary Zachariah	Lake Clifton Eastern High School	Science/ Horticulture
Ms. Janis Seegar	Mr. Robert Marshall	Baltimore School Of Arts	Physics, Earth Science, Computer Programming
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science, Astronomy
Mr. Mark Haley	Ms. Sherry Dagostin	Parkville High School	Biology/Chemistry
Mr. David Tevault	Ms. A. Vignarajah	Southern High School	Computer Sciences
Mrs. Margarite Brooks	Mr. Charles Cross	Elkton High School	Chemistry/Physics
Mrs. Margarite Brooks	Mr. E. Vignarajah	Southern High School	Mathematics & Computers
FY91			
Dr. Mark Haley	Ms. Sherry Dagostin	Parkville High School	Biology/Chemistry
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science, Astronomy
Mr. Robert Gavlinski	Mr. Gregory Lauck	Aberdeen High School	Chemistry
Mr. Michael Goode	Mr. Charles Cross	Elkton High School	Chemistry/Physics
Dr. James Genovese	Mr. E. Vignarajah	Southern High School	Mathematics & Computers
Mr. Michael Goode	Mr. Bernard Stockton	Chesapeake High School	Chemistry & Microbiology
Dr. Randall Wentsel	Mr. William Forster	Fallston High School	Biology
Mr. Robert Gavlinski	Ms. Janet White	Fallston High School	Mathematics
FY92			
Mr. Robert Gavlinski	Mr. Gregory Lauck	Aberdeen High School	Chemistry
Mr. Robert Gavlinski	Mr. Rodney Brewer	Perryville Middle School	Mathematics
Mr. Michael Goode	Mr. Charles Cross	Elkton High School	Chemistry/Physics
Mr. Pete Stopa	Ms. Jennifer Petering	Western High School	Chemistry/Biology
Dr. Emory Sarver	Mr. Robert Marshall	Baltimore School of the Arts	Physics, Earth Sciences, Computer Programming
Dr. Emory Sarver	Ms. Sherry Dagostin	Perryville High School	Biology/Chemistry
Mr. Roy Albert	Ms. Mamie Green	Southern High School	Chemistry/Computer Science
Dr. Randall Wentsel	Mr. Thomas Trafton	Havre de Grace High School	Biology, Earth Science, Astronomy
Dr. Randall Wentsel	Mr. William Forster	Fallston High School	Biology

TABLE 9.

COST - HSSMF



Note: Numbers in bars correspond to total participants per year

TABLE 10.

1992 HIGH SCHOOL SCIENCE & MATHEMATICS PROGRAM ASSESSMENT

NAME:_____

1. How would you generally describe your summer program experience?

2. What aspects of the program, if any, were especially favorable?

3. What aspects of the program, if any, were unfavorable?

4. How do you think the program could be improved?